Report Rapport

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Control Board

Commission de contrôle
de l'énergie atomique

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INFO-0200

METHODOLOGIES FOR EVALUATION OF AECB REGULATORY PROGRAM

by

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A research report prepared for the
Atomic Energy Control Board
Ottawa, Canada

May 1986

Research report

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ABSTRACT

AECB commissioned this report to obtain information about methods of planning and conducting evaluation of its regulatory program. The report begins with a bibliography consisting of 280 abstracts assembled from an extensive search of international literature. Each cited publication describes or uses methods applicable to the evaluation of regulatory programs.

The report continues with a review of the methodologies found in the literature. It identifies the most relevant references for each step in program evaluation: the commissioning of evaluation; the identification of evaluation issues; the defining of questions; the answering of questions; the reporting of results, and the implementation of recommendations. The bibliographic abstracts include coded references to the various sections of the review.

Finally, the report examines the applicability, advantages and disadvantages of the different evaluation methods and makes recommendations about the selection of methods and their application to the AECB program.

RÉSUMÉ

La CCEA a commandé le présent rapport pour obtenir des renseignements sur les méthodes pour planifier et effectuer l'évaluation de son programme de réglementation. Le rapport donne d'abord la bibliographie de quelque 280 résumés de rapports recueillis à partir d'un dépouillement de la documentation internationale. Chaque publication mentionnée décrit ou utilise des méthodes applicables à l'évaluation des programmes de réglementation.

Le rapport examine ensuite les méthodes rapportées dans la documentation. Il indique les références les plus importantes pour chaque étape de l'évaluation de programmes : la mise sur pied de l'évaluation; l'identification des points à évaluer; l'élaboration des questions; la réponse aux questions; le rapport des résultats et la mise en oeuvre des recommandations. La bibliographie des résumés comprend des références codées aux différentes parties de l'examen.

Le rapport examine enfin l'applicabilité, les avantages et les inconvénients des diverses méthodes d'évaluation et formule des recommandations au sujet des méthodes convenables pour évaluer le programme de réglementation de la CCEA.

DISCLAIMER

The Atomic Energy Control Board is not responsible for the accuracy of the statements made or opinions expressed in this publication and neither the Board nor the authors assume liability with respect to any damage or loss incurred as a result of the use made of the information contained in this publication.

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CHAPTER I : INTRODUCTION

1. Work Specifications

This is the final report prepared under the requirements for AECB contract # D1103411300. The tasks to be performed as specified in the contract and subsequently amended were :

1. Conduct a literature search by compiling and annotating a bibliography of existing studies, reports, practices, procedures and experience of other regulatory bodies that have been produced in Canada or in other countries and that are concerned with methodologies for evaluation of regulatory programs, activities or functions.

2. Prepare a report summarizing and analyzing the advantages and disadvantages of the various methods found for evaluating regulatory activities or programs.

3. Review a representative set of regulatory decisions on elements of the regulatory program of the AECB, in consultation with AECB staff. Examine a comprehensive set of AECB regulatory and program management documents and outline the identity and characteristics of AECB programs which may be subject to evaluation.

4. Identify, from the set of regulatory activities and the documents and analysis in 3, the more relevant and suitable methods that could be used for the evaluation of the AECB Regulatory Program. Set out the scope and context within which AECB program evaluation must be conducted. Indicate which methods are most appropriate to evaluation of the program components described under 3.

The Board's purpose in having the work done was to discover methods that might be useful in planning and executing evaluations of its program.

2. Approach and Organization of Report

The approach to the work was simply to complete the tasks in the sequence above. The organization of the report reflects this sequence. The identification of sources of information, literature search and abstracting methods are described in Chapter II which also includes the bibliography itself. Chapter III presents a review of the literature and in each subsection identifies references particularly relevant to the evaluation of AECB programs. Chapter IV analyses the applicability of the methods identified to AECB programs. The organization of both Chapters III and IV follows the steps necessary to complete a program evaluation. The bibliographic abstracts are coded to refer to the sections of those chapters.

CHAPTER II : BIBLIOGRAPHY

1. Literature Search and Selection of References

In conjunction with C. St. Arneault, we drew up a list of 80 agencies concerned with the regulation of the nuclear industry or with similar regulatory responsibilities. The list included many departments and agencies of the Government of Canada and of every province. It also included nuclear regulatory agencies in the United States, the United Kingdom, France, Australia, Belgium, Denmark, Finland, the Federal Republic of Germany, Israel, Japan, Korea, the Netherlands, Norway, Portugal, South Africa, Spain, Sweden, and Switzerland. We contacted each agency on the list by letter, and sometimes by telephone, and requested information relevant to this survey. Responses were received from 55 agencies, a success rate of 69%.

Although this was an unexpectedly high response rate, we uncovered surprisingly few useful references by this method. Some of those that we did find, including several originating from the Government of Canada, were classified material and cannot be quoted. Fortunately this did not prove to be an obstacle to our survey. Most references were found by standard library search methods. We benefited greatly not only from access to the University of Calgary Library and its inter-library loan system, but also from the assistance of the library staff. Two of us also visited the AECB Library in Ottawa and Remi Gaudet, the Chief Librarian, helped us to obtain some reports. We were also able to turn up some useful material in our own library and through our contacts with members of several government agencies.

In conducting our literature search, we cast our net as broadly as possible because we had been encouraged by AECB to consult unconventional sources as well as the more obvious ones. In terms of academic disciplines, we covered in detail those most closely related to program evaluation. These include : administrative and political science; sociology; human, including organizational, behaviour; management sciences; economics and accounting; planning; policy analysis; and law and law enforcement. We also explored disciplines related to the responsibilities of AECB, including : engineering; environmental sciences; public health; and the technical aspects of standard-setting, simulation modelling and risk analysis. We gave priority to papers on the nuclear industry or nuclear regulation, but also considered those dealing with industries encountering similar problems or requiring similar regulatory arrangements. The closest analogs are in other energy industries, mining, smelting and refining, and other industries that produce or use hazardous substances.

Naturally our first priority in the search was finding references on program evaluation that included information specifically relevant to evaluation of AECB programs. What we mean by "relevant" in this context is references that : (i) raise issues appropriate to program evaluations or provide analysis that enables identification of such issues; (ii) propose, describe, compare or assess methods of program evaluation ; and (iii) include actual examples of program evaluation. As stated earlier, relevance was further qualified by the applicability of the methods, or comparability of the subject matter, to AECB programs.

We had indicated in our proposal to undertake this contract that we expected to find relatively few references that deal directly with the evaluation of regulatory programs. Before beginning our search, we had believed that most of the literature on program evaluation was specific to social and educational programs and that it would be inapplicable to regulatory programs. We had expected that most of the references we would find would be, at best, marginally relevant and that we would have to include many of only peripheral interest in order to produce a substantial bibliography. These expectations proved almost entirely wrong. A large proportion of the references we found do deal with social and educational programs, but the methods used and the difficulties encountered are not irrelevant to the evaluation of regulatory programs. We also found many more references that do deal with regulatory programs than we, or AECB, had anticipated.

2. Abstracting Methods and Organization of Bibliography

Each of the listed references was read and abstracted by one of the three authors of this report and the abstract was edited by another. In each abstract we attempted to indicate the nature of the subjects addressed in the publication and its relevance to evaluation of AECB programs. In some cases we felt it necessary to mention or quote specific items of particular interest. Decisions to do so were based on personal judgement, but were strongly constrained by the need for brevity. As it was, the potential length of the bibliography often threatened to get out of hand.

We considered several methods of organization of the bibliography, but settled for a simple alphabetic listing. The reason was that most of the references include information about several components of program evaluation and no simple unidimensional classification by subject is feasible. A further argument in favour of an alphabetic listing by lead author is that most professionals remember papers and reports by the authors' name and year of publication.

3. Coding and Cross-Reference System

Chapter III of this report is a review of the contents of the bibliography in so far as they apply to AECB. The review is organized in accordance with the consecutive steps required to complete a program evaluation and there are further subdivisions within those steps. We have included in each bibliographic abstract cross references to the appropriate sections of the review. These bibliographic categories are listed in Table 1. Section 5 of Chapter II lists, by author, all the references in the bibliography and review that are relevant to each topic or subtopic in Table 1. The reader can therefore find references on any topic without having to read the review or non-relevant parts of the bibliography.

We have listed in each section of the review, all papers in the bibliography that are relevant to the subject or subjects covered in the section. The reader can therefore discover references relevant to a particular evaluation topic by consulting the review. Please note that there are a few explanatory sections in the review for which no references are listed.

The reader may also obtain a general idea of the context and applicability of any particular reference by consulting the appropriate abstract. This will be useful when consulting a series of references listed in a section of the review or when merely browsing through the bibliography.

Table 1 : Bibliographic Classification

A : Initiating Program Evaluation

A1 : Definitions of program evaluation.
A2 : Usefulness of program evaluation.
A3 : Where evaluation fits in the management of government programs.
A4 : Steps in program evaluation.
A5 : Commissioning evaluations.
A6 : General texts.

B : The Descriptive Step

B3 : Properties of descriptive models.
B4 : Relevant references from the bibliography :
  B4.1 : Methodological references.
  B4.2 : Examples of descriptions.

C : Identifying Evaluation Issues and Defining Questions

C2 : Values and perspectives.
C3 : Identifying generic issues :
  C3.1 : Generic issues.
  C3.2 : Use of descriptive models to define questions.
C4 : More specific questions :
  C4.1 : Process oriented approaches :
    C4.1.1 : Entire regulatory process.
    C4.1.2 : Efficiency of regulatory process.
    C4.1.3 : Political process.
  C4.2 : Impact oriented approaches :
    C4.2.1 : Entire regulatory program.
    C4.2.2 : Technical issues :
      C4.2.2.1 : Health and environment.
      C4.2.2.2 : Safety and security.

D : Methods of Answering Evaluation Questions

D1 : General methods of enquiry.
D2 : Methods specific to disciplines or applications :
  D2.1 : Political and social sciences.
  D2.2 : Law and public administration.
  D2.3 : Management sciences and business methods.
  D2.4 : Economics and accounting.
  D2.5 : Economic impact analysis.
  D2.6 : Science and engineering :
    D2.6.1 : Standard-setting.
    D2.6.2 : Simulation modelling and risk analysis.
    D2.6.3 : Effectiveness of health, safety and environmental regulation.
    D2.6.4 : Technology assessment.
  D2.7 : Inspection and enforcement.

E : Integration and Use of Results of Evaluation

E1 : Evaluation in the context of program management.
E2 : Improving the acceptability and applicability of results.

4. Bibliography

Abert, J.G. 1979. Evaluating Evaluation. In Program Evaluation at HEW, Part I. Ed. J.G. Abert. New York. Marcel Dekker Inc.

D2.1, D2.4

The author discusses evaluation methodology applied to the social welfare and education programs administered by the U.S. Department of Health, Education and Welfare. Some aspects of the use of cost-benefit analyses that are reviewed in the paper are relevant to the evaluation of regulatory programs, such as that of AECB.

Adam, N.R. & A. Dogramaci (Eds) 1981. Productivity Analysis at the Organizational Level. Studies in Productivity Analysis Vol. III. Martinus Nijhoff Publishing.

A6, C4.1.2, D2.3

This is a volume of original papers on measuring, analysing and improving productivity in an organization from the point-of-view of economists, industrial engineers, operation researchers, management scientists and lawyers. The section on "Some Productivity Issues in Public Organizations" is especially relevant to AECB. A paper by Savas opens with a discussion of the factors accounting for low productivity in government organizations - which include unclear definitions of programs, difficulty in measuring a program's achievement, and the lack of an effective link between the performance of a worker and his reward. He discusses improving public sector productivity through competition. Schmetz discusses public sector productivity and collective bargaining.

Alberta. 1985. Progress Survey of Deregulatory Initiatives by Government of Alberta Departments and Agencies. Caucus Committee on Economic Affairs.

A3, C4.2.1, D1, D2.2

The report outlines the methodology and interim results of an ongoing program by the Alberta Government Caucus to simplify regulatory processes in the Province. Regulatees, primarily business associations, were invited to comment on regulatory reform matters, and their comments were directed to the appropriate regulatory agencies and departments for response. The report summarizes these concerns and responses and outlines steps taken toward deregulation within each department of the Provincial Government.

The report is an example of the evaluation of regulatory programs commissioned by the virtual equivalent of a parliamentary committee and based on the opinions of regulatees. It is a method applicable to AECB, whether as a fact-finding exercise to determine the level of satisfaction with existing programs and the perceived need for reform, or as a direct means of initiating discussion on the future course of regulatory activities.

Alberta, Environmental Council of Alberta. 1979. The Environmental Effects of Forestry Operations in Alberta. Report and Recommendations. Environmental Council of Alberta.

D2.5

This report includes a _de facto_ evaluation of forest land use regulation in Alberta. It examines, with detailed examples, the impact of other land use activities on the forest resource. Included is a specific analysis of the effects of oil and gas exploration, which the Council concludes are not regulated effectively enough to reduce impacts on forests to an acceptable level. While the methods used in the analysis are specifically relevant to only a small part of the activities regulated by AECB, the general approach to assessing unwanted economic impacts is pertinent.

Anderson, R.D. 1981. Government Regulation of the Canadian Dairy Processing, Distributing and Retailing Sector. Economic Council of Canada Working Paper #25.

B4.2, D1

The paper describes the Canadian dairy industry and its regulation, and presents case studies which identify regulatory effects and imperfections. Data collection was based on interviews, and recommendations are made for reform of regulatory procedures. It is useful to AECB as an example of the determination of intended and unintended effects of regulatory programs.

Ash, R.L. 1971. A New Regulatory Framework : Report on Selected Independent Regulatory Agencies. U.S. Government Printing Office.

C3.1, C4.1.2, D1

This is the report of The President's Advisory Council on Executive Organization. The Council studied independent regulatory agencies in the U.S. that are concerned with economic regulation. It began with the premise that the recognized failings of the agencies at the time were due to inflexibility. It identified the following characteristics of the agencies as accounting for that inflexibility : their collegial method of making decisions, their lack of accountability, the vagueness of their legislative base, their time-consuming quasi-judicial methods and problems of coordination between agencies. The Council recommended reorganization of regulatory responsibilities within the U.S. Government with some rationalization of agencies with related mandates. It also recommended some restructuring within agencies and time limits for the various phases of regulatory review and approval processes. Finally the Council recommended the creation of an Administrative Court for review of regulatory decisions.

The Council's method was that of traditional scholarly enquiry. It was criticized for relying on subjective impressions and conventional wisdom, rather than gathering substantial amounts of data documenting the performance of the agencies it reviewed and performing "objective" analyses. It also failed to examine in any depth alternative approaches to accomplishing regulatory goals (see Noll (1971) this bibliography). The Council report is useful in raising and documenting many concerns about the fairness, efficiency and effectiveness of regulation that are perhaps more strongly voiced in the United States than in Canada.

Asmis, G.J.K. 1981. Role of the Regulatory Body Related to Siting. AECB.

C4.2.2.2, B4.2

This is the outline of a lecture given at the IAEA Nuclear Power Course, Argonne National Laboratory, about the role of AECB in the nuclear power station siting process. It describes the Board's legal structure and safety criteria. It then discusses the implementation of these criteria as related to the siting of a representative power station (Darlington) focussing on the safety aspects of external hazards such as tornados, earthquakes and explosions. The paper provides the basis for the descriptive step in an evaluation of this part of AECB's regulatory program.

Atomic Energy Control Board Staff. 1983. Regulation of Nuclear Activities in Canada. AECB.

B4.2

This report describes the historical background and provides a general overview of the use and handling of nuclear energy in each area in which the AECB has responsibility; the governmental framework controlling nuclear activities; and the agencies involved in its research and industrial applications. The regulatory power and structure of the AECB are highlighted. Evaluators should read this report before embarking on evaluations of AECB regulatory programs.

Austin, M.J. & Associates. 1982. Evaluating your Agency's Programs. Sage Human Services Guide Vol. 29. Sage Publications.

A4, A6, C3.1, E1, E2

This is a program evaluation guide seeking to place the relevant evaluation tools into the hands of agency staff and board members. The first chapters aim to help staff to move from thinking about program evaluation to actually doing it, by answering questions on : "Why conduct program evaluation?"; "What is it?"; "How to get ready?"; and "How to get started?". Examples are given of how to apply evaluation methodologies by seeking answers to the questions "How does a program coordinator or supervisor evaluate the effort of delivering services to a population of clients?" and "How does a program coordinator or supervisor evaluate the effectiveness of indirect services such as prevention services?".

Appendix A and B offer examples of single case evaluations and illustrate selected program evaluation principles and practices such as evaluation question formulation, instrument development, data collection practices and data analyses. The book also addresses evaluating program efficiency and linking program evaluation to progam planning by answering the questions : "How does a supervisor approach the process of assigning specific costs to particular programs?"; "How does a manager organize program evaluation data into a system for future monitoring?"; and "How does one relate program evaluation results to agency program planning?"

This is one of many textbooks on evaluation that are generally, rather than specifically relevant to the evaluation of AECB programs.

Australia. 1979. Protective Security Review. A Report. Australian Government Publishing Service, Canberra.

C4.2.2.2, D2.2, D2.7

This is a review (public commission style) instigated by the Government of Australia after a bomb incident, to look into different aspects of protective security. The subject is not directly relevant to the AECB (although nuclear materials are mentioned briefly) but it does deal with regulatory matters and public safety, both of which are of interest to AECB. Unlike most commission reports, this one describes in detail how the commission went about its work, information of potential value to AECB should it wish to initiate a commission of inquiry.

The Review Committee followed the terms of reference given by the Government; these were were advertised widely, and papers and submissions invited. Submissions came from Commonwealth

Departments, authorities and officials, and private and public interest groups. The Review did not have any special powers to compel attendance at its hearings. Discussions were held with the Premiers of each State and other officials to seek guidance on explosives, ordnance and protective standards, and staff held discussions with explosive manufacturers. Talks were also held with government officials from the United States, Canada, the United Kingdom, Netherlands, the Federal Republic of Germany and Commonwealth Ministers. Documentary material was reviewed and some papers were specially prepared for the Committee. The Committee attended counter-terrorist and anti-hijacking exercises and inspected installations to understand the degrees of variance which can arise from human factors or chance. Many recommendations were made. The subject matter and methods are obviously relevant to any evaluation of AECB's security responsibilities.

Australia. 1976. Royal Commission on Australian Government Administration. Report and Appendices. Australian Government Publishing Service, Canberra.

A3, C3.1, C4.1.2, D2.1, D2.2, E1

The Commission report is of particular interest to evaluators of Canadian Government programs, including those of AECB, because Australia has perhaps the most similar form of government to our own. The report is of methodological interest as a Commission of Inquiry because it includes a long chapter in which the methods employed are fully described. There are many appendices to the report, including one by Matthews (1976) on public participation which is listed separately in this bibliography.

The treatment of administrative efficiency in the Commission report itself, and in its various appendices, is exhaustive. The Commission considers that efficiency is likely to be promoted if :

> "(a) the objectives to which work is to be directed and the priorities attached to them are stated clearly;
> (b) decision makers at all levels have scope to act entrepreneurially;
> (c) officers are able to identify themselves with the objectives to which their personal efforts are directed, and with the ways in which these objectives have been determined and the related work organized;
> (d) staff involved are appropriately recruited, trained, organized and promoted;
> (e) managers at all levels have access to both the information upon which their actions should properly depend, and to the appropriate expertise in managerial and related techniques;

> (f) performance at all levels is regularly assessed and those responsible are held accountable for it in ways which ensure that the assessment bears upon their rewards, standing and future."

The Commission goes on to recommend the use of comprehensive audits and evaluations on the U.S. General Accounting Office model, composed of three elements : (i) financial propriety and regulatory compliance; (ii) economy and efficiency; and (iii) program results.

The report of the task force on efficiency outlines some of the obstacles and limitations to achieving improvements in administrative management. It cautions against expecting too much from evaluations as can be seen in its recommendations on the subject : "Institutionalization of Change Agents" :

> "40. Government organizations have to be their own change agents and for this purpose their managerial services sections must be reorganized to allow line management greater participation.
> 41. Efficiency reviews, as recently inaugurated, are of dubious value but represent an improvement on inactivity and therefore should be continued and persisted with until results flow, it is a surprising and questionable practice to keep the findings so secret on matters of public (not private) administration.
> 42. Royal Commissions and public inquiries also have their place.
> 43. Organizational Development (OD) programs of self-diagnosis should be fully supported and encouraged."

The report and appendices are useful to commissioners and designers of evaluations who must identify the scope of evaluations and broad categories of issues to be addressed. They are also useful to those conducting more specialized evaluations of administrative, including regulatory, processes.

Aviel, S.D. 1982. The Politics of Nuclear Energy. University Press of America Inc.

C3.1, D1

The author examines the evolution of the nuclear power industry in the U.S. since World War II and describes the recent accident at Three-Mile Island. To investigate the impact of Three-Mile Island on congressional attitudes, he conducted a questionnaire and interview survey of members of Congress and state governors following the official inquiry into the accident. The methodology is standard and could be used by AECB to investigate public and political opinion in any area of AECB regulatory responsiblity.

Baker, R. & F.A. Meyer Jr. (Eds). 1979. Evaluating Alternative Law-Enforcement Policies. Lexington Books.

D2.7

The book is a collection of papers dealing with public perception and evaluation of law enforcement policies and the work of the police. The essays have some relevance to AECB for two reasons : some of the work of law enforcement agencies is analagous in many respects to securing compliance with regulation; and the service or product is similarly difficult to value or cost and difficult to assess in terms of effectiveness or efficiency. Several of the papers discuss the problems of defining and measuring productivity and effectiveness. Others deal with assessing public opinion as it relates to enforcement programs. Some of the evaluation methods are applicable to evaluation of AECB inspection and enforcement programs.

Bardach, E. and R.A. Kagan (Eds). 1982. Social Regulation : Strategies for Reform. Institute for Contemporary Studies. Transaction Books.

C4.1.2, C4.1.3, C4.2.2.2

This is a study of social regulation, by 12 contributors, bringing together economics and politics and focussing on stategies for reform that make political, institutional and economic sense. Many of the papers in the volume are of interest to evaluations of the economic and political aspects of AECB's regulations. Others would be useful in framing questions for evaluations of efficiency of the regulatory process.

Danceau's paper on developing a successful enforcement program discusses on-site inspection programs; the adversarial relationship between inspectors and industry; standards, procedures and company problems; violations, citations and fines; and preventive measures. Pape discusses issues in food safety regulation including the inconsistency in regulations because of the conflicting mandates of the food industry. Havender, in discussing assessing and controlling risks, includes a section on the undesirable behaviour of regulatory agencies mentioning : slowness; regulating for worst situations; resisting economic considerations; ignoring increased risks of delays; ignoring information that cannot be readily articulated; having a central perspective; and tending to base regulation on premature or unconfirmed scientific evidence. Bardach and Kagan discuss responsibility and accountability. Bardach discusses self-regulation and regulatory paperwork, including : paperwork involved in compliance, survey evaluations and research; paperwork as an enforcement mechanism; the deterrent value of documentation; controlling the costs of paperwork; and regulatory competence.

Basuk, J. and A. Nichols. 1979. An Overview of Ionizing Radiation Hazards in Canada. Science Council of Canada.

C3.1, C4.2.2.1, D1, D2.6.1

The authors provide a thorough account of radiation hazards in Canada and the dangers of exposure. They briefly review current standards of radiation protection and processes of licensing and control. Several case studies of exposure to radiation in Canada are presented, and "regulatory issues" are identified. These issues are suitable subjects for evaluation questions in any review of the effectiveness of regulation, particularly one concerned with technical and scientific standards. The authors' method is document review; the text consists almost entirely of quotations. The paper is useful in defining public health issues in evaluations of AECB's programs.

Bayda, Mr. Justice E.D. (Chairman). 1978. The Cluff Lake Board of Inquiry - Final Report. Saskatchewan Dept. of Environment, Regina.

C4.2.2.1, D2.1, D2.2, D2.6.3

The report records the findings of a public inquiry into the potential health, safety, social, and environmental effects of a proposed uranium mine and mill at Cluff Lake, and more generally, the social, and economic implications of expansion of the uranium industry in Saskatchewan. The Commission heard evidence from experts and the public. Recommendations made to AECB and the federal and provincial governments covered standards for exposure and the enshrinement of the ALARA principle in AECB regulations, as well as other subjects.

Public inquiries are well known and widely used in Canada. This one followed the normal procedures and is relevant to AECB because of its subject matter rather than its method.

Beeghly, H.F., J.P. Cali and W.W. Meinke (Eds.). 1968. Nuclear Standards for Chemistry and Technology. Nuclear Standards for Industry, Science, Government and Consumer. Proceedings of Am. Chem. Soc. Symposium on Standards in Nuclear Chemistry and Technology, Sept. 8-9, Atlanta, N.J. National Bureau of Standards Special Publication.

D1, D2.6.1

These are the proceedings of a symposium bringing together groups with interests in nuclear standards for science and technology to identify problems and discuss present programs and future needs. Standards here are defined broadly. There are about 30 papers from different organizations on varying aspects of the subject. National and international programs for standards are discussed in such areas as the public health service, radioisotope development, nuclear safeguards, government assistance and nuclear instruments in the laboratory. Many of the papers are of interest to those responsible for defining criteria for evaluation of AECB's licensing and permitting programs.

Beesley, M.E., P. Gist and S. Glaister. 1983. Cost Benefit Analysis and London Transport Policies. In Progress in Planning, Volume 19. Pergamon Press, Oxford.

D2.1, D2.4

This paper is a report of a social cost-benefit analysis of London Transport Policies. It studies the effects of a given change in conditions (in this case a price rise or service charge) and asks what the main impacts are likely to be and on what interests. It seeks to put a value on these impacts. It concentrates on consumers directly involved, then traces the effects on the main outside consumer interests and finally takes into account the general public interest - such as in the disposal of economic resources. The analysis is only one tool that will be used in formulating policy. The paper is of interest to AECB because it is an example of an actual social cost-benefit study with all details and calculations included. It is useful as an example of how to assess program impacts and it could also be useful to AECB, as an example, if a socio-economic impact analysis of changes in regulation is required.

Berry, W.D. 1982. Theories of Regulatory Impact: The Roles of the Regulator, the Regulated, and the Public. Policy Studies Review 1(3): 436-441.

A2, B3, C4.2.1

The paper examines briefly traditional theories of regulation under three categories. The first includes theories of commission inadequacy wherein the regulatory agency fails because its personnel are not competent to deal with the complex problems confronting them. The second and third are two kinds of group theory advanced by political scientists and economists, respectively, who see the regulatory process as a struggle between group interests and as a means of distributing benefits to powerful groups in society. The author concludes that these theories only deal with one, or at most two, of the participants in the regulatory process and that a new theory describing regulatory impact on the regulator, the regulated, and the public is necessary. The paper is of interest as background to general theories of regulation, in identifying evaluation issues, and perhaps as a reminder to the AECB of the need to take account of the growing role of interest groups in the nuclear industry.

Blewett, E., W. Furlong and P. Toews. 1985. Canada's Experience in Measuring the Deterrent Effect of Fisheries Law Enforcement. Program Evaluation Branch, Department of Fisheries and Oceans.

C4.2.2.2, D2.7, D1

The paper describes a method for estimating the deterrent effect of fisheries law enforcement programs. These include prosecution-oriented enforcement and prevention-oriented enforcement such as licensing, quotas, restrictions and taxes. The key question in this type of evaluation is how to measure deterrence, since it is unobservable. Another problem is that the number of offenses committed is not known as many infractions go undetected.

Personal interviews with fishermen were conducted to obtain data for economic analysis of participation in illegal activities. There is a discussion on the design, and examples are given of the questionnaires used to obtain information on the fishermen's perception of enforcement, the extent of non-compliance and the probabilities, gains and losses associated with fisheries illegalities. There are discussions and analyses, given in full mathemetical detail, of the probabilities of arrest, prosecution and punishment, the gains and losses associated with non-compliance, and participation and violation rates. Socio-economic and other variables are also discussed. A section on some deterrent results and implications for program delivery is interesting and also includes discussion on how the data were analysed.

The section on "estimating the supply of offenses" discusses the responsiveness of violation rates to changes in policy instruments - the severity and likelihood of punishment. The authors use multivariate analysis to determine the violation response function.

The methodology is described clearly and in detail, and it was hoped by the authors that it would help other jurisdictions in evaluating their own inspection and enforcement programs. The treatment is comprehensive and the approach to the problem of evaluating regulatory compliance is of particular interest to AECB.

Borich, G.D. and R.P. Jemelka. 1982. Programs and Systems : An Evaluation Perspective. The Educational Technology Series. Academic Press, New York.

A4, A5, A6, B4.1, C2, C3.2, D1, E2

The central concepts of this book are decisions, values and systems. The authors show how they come together to create a network of ideas, activities and responsibilities for program evaluation. Values play a vital role in binding together this network and providing a standard for planning and evaluating programs. The book plays on the "value" in evaluation. It is written mostly from the point-of-view of educational and human services programs, but many points are relevant to all programs. It is useful in that it considers for evaluation the whole system and its interactions, rather than one isolated aspect of a program.

The authors begin with a description of the history and growth of program evaluation, followed by a discussion of the decision-oriented nature of program evaluation - the political context, methodological flaws of the approach and new directions for evaluation. They then discuss the value-oriented concept of evaluation, giving values and sources for obtaining values. Naturalistic inquiry models for collecting value-oriented data are discussed, including a responsive model, judicial model, transactional model, connoisseurship model and illumination model. A figure shows how to recognise value oriented criteria. Needs assessment is discussed.

Several chapters are devoted to concepts, trends, theory and practical models of the systems approach to evaluation and the limitations and atheoretical nature of systems literature. Methods of developing systems models for evaluation and of putting them to use, are described in detail and summarized in the appendix. The appendix also gives a brief description of the use of program modelling to describe, clarify and communicate the milieu of values in which a program functions.

Although most of the examples in the book are from educational programs, it is one of the most useful to AECB of the general texts on evaluation. This is because of : (i) the penetrating analysis of values and assumptions in defining the scope of evaluation and the major issues to be addressed; and (ii) the lucid account of the use of systems models in program description and analysis.

Brantingham, P.L. 1981. The Burnaby, British Columbia Experimental Public Defender Project : An Evaluation Report. Summary and Six Volumes. Department of Justice, Canada.

B3, C4.2.1, D1, D2.4, D2.5

The Department of Justice initiated a procedure to explore the comparative impact and cost of the judicare and public defence modes of delivering legal aid. The first step involved a detailed review of the debate on the subject, and methods of delivering legal aid. The next step was the design of an experimental project and concurrent evaluation strategy. The third step consisted of setting up an experimental public defence office in Burnaby, British Columbia, and evaluating the operation over two and a half years.

There were six major goals of the evaluation : the analysis of the relative effectiveness of two modes of delivering legal aid; the analysis of relative costs; the determination of client satisfaction; the analysis of the time spent by lawyers, and possible alternative tarrif structures; the determination of the relationships that develop between defence counsel, crown counsel and judges; and the projection of the impact of the introduction of a broader network of criminal defence offices on the private bar.

Report I is a summary paper and Reports II to VII each deal with a major goal of the evaluation. These reports are all of interest to AECB as they are analyses of costs, benefits and impacts of current regulatory procedures and possible changes in those procedures. The study is also a rare example of the application of experimental evaluation methods in Canada.

Breyer, S.G. & P.W. MacAvoy. 1974. Energy Regulation by the Federal Power Commission. The Brookings Institute. Washington.

B4.2, D2.4, D2.5

This document presents an evaluation of the Federal Power Commission. It estimates the direct and indirect (to industry) costs of regulation and deals with the effects of regulation on prices. It uses classic economic techniques to produce a cost-benefit analysis of FERC regulation. Shortcomings of regulatory agencies such as "capture by industry" are discussed in the context of economic efficiency. Nuclear power for electricity generation plays no significant part in the analysis but the methodology is applicable to AECB program impacts.

Britain, G.M. 1981. Bureaucracy and Innovation - An Ethnography of Policy Change. Sage Library of Social Research. Vol. 115. Sage Publications.

C4.1.1, C4.1.2, D2.5, E2

The book examines the U.S. "Experimental Technology Incentives Program" (ETIP) established : (i) to investigate the relationship between public policy and innovation; and (ii) as a means to foster change in bureaucratic policy and practice in order to encourage technological innovation in private industry.

The author evaluates the ETIP experiment in relation to its objectives but also, more significantly, as a tool for examining the effects of government policy and activities on the broader social and economic environment within which industrial innovation takes place. Standard methods were used to study the program. All aspects were described in detail and summarized in an analysis of ETIP's progress, problems, and potential.

The report is a study of an area of particular interest to regulatory agencies such as AECB - the criticism that regulation stifles innovation in the regulated industry - and provides an interesting perspective on ways to identify and investigate the role and impact of the regulator. It also serves as an example of an innovative evaluation tool.

British Columbia. 1980. Royal Commission of Inquiry, Health and Environmental Protection - Uranium Mining in British Columbia. (Bates Commission).

C3.1, C4.2.2.1, D2.2, D2.6.3

The Bates Commission was formed in 1979 and instructed by the provincial government :

- to examine the adequacy of existing federal and provincial requirements for the protection of the health and safety of workers in the uranium exploration, mining, and milling industries in B.C. and for environmental and public protection in general;
- to make recommendations for standard-setting in the areas of worker safety and environmental protection.

The inquiry followed a standard Royal Commission format with public hearings, and in this case, visits to uranium exploration sites in B.C. An interim report (August 1979) was issued prior to completion of the public hearings. This report was prompted in part by a decision by AECB in summer 1979 to stop licensing uranium exploration unless the operator planned to remove more than 10 kg of uranium or thorium from any one deposit in any one year. The final report recommends that the Provincial Government step in to control activities which now fall outside AECB licensing, and identifies several potential hazards to the public, the environment, and workers associated with exploration activity. The report also identifies problems associated with public access to information, and communications between AECB and the public. The report concludes that the operation of the current regulations is unsatisfactory and makes recommendations for improved practices in several areas.

In several ways, the report evaluates the work of AECB and, in this instance, the subject and content of the report rather than the methodology are of most interest to the Board.

Brown, D.S. 1971. Federal Contributions to Management-Effects on the Public and Private Sectors. Praeger Special Studies in the U.S. Economic and Social Development. Praeger.

D2.3, D2.4

The volume contains a collection of papers describing United States federal contributions to the theory and practice of management. Three chapters are applicable to an AECB evaluation.

Kendrick discusses the development and use of statistical measures of organizational productivity. Goode examines the

management audit. He looks at different types of audit by objectives, scope, and format and lists a range of techniques available, from interviews and questionnaires to complex cost analyses. The article concludes with three brief case studies of the application of management audit programs to government departments. Page describes the Planning-Programming-Budgeting process as applied to the Department of Defense.

These articles are somewhat dated and are of historical interest to evaluators in illustrating the rapid evolution of management and evaluation methods over the last 15 years. More recent papers are included in this bibliography which describe current advances in the use of the same techniques.

Brown, M.S. 1980. Acceptable Risks : Occupational Health in the Nuclear Industry. Cornell Univ. Ithaca N.Y.

D2.6.2, D2.6.3

This thesis includes a discussion of what are acceptable standards of exposure to radiation. In particular, methods of risk-benefit analysis are reviewed and a series of questions are raised which should be asked when undertaking such analyses. The methods are applicable in evaluations of AECB's programs of health and safety regulation.

Brown-John, C.L. 1976. Defining Regulatory Agencies for Analytical Purposes. Can. Public Admin. 19(1): 140-157

B3, C3.1

The paper describes an ongoing program of research into regulatory agencies in Canada undertaken at the University of Windsor. This paper deals with only one aspect of a broader study which investigates regulatory bodies from the point of view of access for interested parties (through an analysis of procedures) and from the point-of-view of efficiency (through development of assessment criteria to be applied to the work of these agencies). Based on questionnaire response from agencies throughout the country, and an analysis of their enabling legislation, the author developed an operational definition of regulatory agencies based on a definition of the terms used to describe their work. He notes problems in devising analytical techniques and also discusses lack of definition and precision in the statutory definition of many agency mandates. He comments that legislators consistently mix regulatory, adjudicatory, and administrative functions in one agency and advocates that regulatory agencies be seen not only as a convenience for dealing with one aspect of government work but as a reflection of overall government policy.

Brown-John notes that "the absence of some form of regular scrutiny process for the activities and behaviour of a wide range of regulatory agencies is a serious defect in the legislative process".

The paper provides interesting background material for the development of an AECB evaluation but does not have direct methodological application.

Bulmer, M. (Ed.). 1980. Social Research and Royal Commissions. George Allen & Unwin, London.

D2.2

Bulmer draws on a large number of British commissions for examples. He discusses what impact social research has on public policy, how that impact is exerted, what is meant by research in this context and what part theoretical social science plays in such research activity.

His case studies describe the work of various commissions over the last 15 years, focussing on the type of questions asked by each commission. Royal commissions and departmental committees of enquiry covering such topics as local government, primary education, overseas representation, personal social services, air transportation and planning, privacy, the press and income and wealth are included. Each chapter deals with a different commission, its establishment and its methods. Bulmer discusses some of the most difficult problems faced by commissions. One of these is impartiality : a judge can be chosen as chairman, but written depositions are always from interested parties and this tends to bias the proceedings. Types of research used by commissions were statistics and intelligence, analytical descriptions, causal analyses, testing of theoretical models, cost analysis and the general methods of scholarly enquiry.

AECB could use this book as a source of information about different types of commissions, their effectiveness, their methods, and their limitations. It would be useful in evaluating AECB's own public inquiry system.

Burn, D. 1967. The Political Economy of Nuclear Energy. An Economic Study of Contrasting Organizations in the U.K. and the U.S.A., with Evaluation of Their Effectiveness. Institute of Economic Affairs.

C4.1.1, D2.6.4

The paper contrasts and compares the growth of the civilian nuclear power industry in the U.K. and the U.S. in the 1960's. Technological and design differences in the two countries are discussed, but the main thrust of the report is an evaluation of different systems of political economy and the impact of different approaches to regulation on cost and technological innovation.

The author examines the history of civilian applications of nuclear power in the U.K. and U.S. from 1950 to 1966. He discusses technological developments in both countries, and the safety, environmental, and cost considerations of each country's chosen system, and each country's record of technology assessment and cost effectiveness in construction. Burn then poses several questions regarding apparent higher costs, slower construction times etc. in Britain and attempts through examination of the political economy of the two systems to account for these differences.

Britain's nuclear industry developed as a monopoly which, the author believes, led to premature decisions on reactor type, inefficiency, slow technological development, lack of standards against which to measure performance of the utility, and ultimately more costly uncompetitive prices for electricity. In contrast, he believes the U.S. free market system and open competition encouraged innovation and cost effectiveness.

The report is an evaluation of two systems of approach to nuclear development and regulation. Both the content and the detailed meticulous use of standard techniques are of interest to AECB. Although the material is dated because of changes in technology and regulatory focus, the evaluation of the effects of two quite different political and regulatory philosophies on the nuclear industry remains valid.

Cairns, R.D. 1980. Rationales for Regulation. Technical Report No.2. Economic Council of Canada.

A5, B3, C2, C4.2.1

This is a review of the literature on regulation. The perspective is that of an evaluator of economic regulation interested in goals, methods and effectiveness.

Cairns notes differences between Canada and the United States. For example, in Canada more than economic efficiency has been central to policy making.

One theme of the paper is the evolving conception of regulation. This has changed from the early 1970's, when it was thought that regulation-induced market failures were intended, and supply and demand models were developed with rewards to private interests in mind rather than the public good, to the late 1970's when the market was recognised to be imperfect, and regulation was thought to be a contract giving a brief respite from political disequilibrium and enabling long-term planning. Cairns concludes that much regulation is economically inefficient. However, efficiency is not necessarily the only factor to consider, though an understanding of it is necessary when planning public policy. With the complexity of modern life and pressing international problems, more and more regulation is becoming necessary.

This report covers first premise evaluation questions applicable to any regulatory agency, and reviews the extensive literature on the subject.

Calabresi, G. 1970. The Costs of Accidents - A Legal and Economic Analysis. Yale University Press.

C4.2.2.2, D2.4

This book examines what society wants a system of accident law to accomplish and analyses how different legal approaches to accidents would achieve this. It aims to determine what goals are best accomplished by what types of systems, what systems are best suited for dealing with combinations of goals and what systems are most suitable when one goal predominates. The book begins by discussing areas of confusion in the field, and the lack of an underlying theoretical base of accident law. Fairness and cost reduction, which are the principal goals of accident law, are described. Cost reduction can be attempted by : reducing the number and severity of accidents, either by regulating against specific activities or by making them more expensive; by reducing societal costs resulting from accidents; and by reducing the costs of administering the treatment of accidents. The principal methods of achieving cost reduction in these three ways are described. The theoretical bases of the methods are examinined and the methods are evaluated for goal achievement and limitations imposed by the goals. The general deterrence approach and specific deterrence approach to assigning accident costs are examined for specific problems. The fault system as a device for achieving the goals of accident law is analysed and contrasted with other possible systems.

Calabresi raises issues that would be of interest to evaluators dealing with AECB's regulatory program in so far as it is intended to prevent or reduce the incidence of accidents and to deal with their consequences.

Canada, Department of Health and Welfare. 1984. Environmental Hazards Evaluation Study. Health Protection Branch.

C3.2, C4.2.1, D1, D2.6.3

We have only seen the "Study Design" section of this study. The evaluation approach used was that recommended in HWC's evaluation assessment study. A study team of a Health Protection Branch Management Process Officer, a program manager, an expert consultant and a contract data collector performed the evaluation. A quasi time series approach was applied throughout the collection, analysis and comparison of program output data covering a period of four years. A journalistic approach was used in analysis of program files and reports, and by interviews with program staff and clients. Expert opinion was also sought. A table shows which techniques were used for each evaluation question.

Eleven evaluation questions were asked and for each of these a series of indicators was set out - if these were covered then the evaluation question was considered to have been answered positively. Evaluation questions asked were on mandate issues, objectives achievement issues, and program alternative issues. Mandate questions addressed the strengths and clarity of the mandate, its overlap with and duplication of other programs, and the consistency of activities and outputs of the program with the mandate. Objectives achievement issues addressed the identification of health risks, safety measures, the timeliness and effectiveness of advice to organizations, the timeliness and effectiveness of public information, and whether advice being sent to other federal departments and agencies was being used effectively. Alternative issues questions addressed whether there were more effective alternative programs or methods and more effective ways of delivering the program. For example : are there other mechanisms for delivery of information and advice that would be more effective. This evaluation is of interest to AECB as the subject matter is relevant, and it would help in formulating appropriate evaluation questions to ask. It also follows the Treasury Board evaluation directives.

Canada, Office of the Auditor General. 1978. Comprehensive Auditing - Planning for Century II. Proceedings of the Centennial Conference. Ottawa.

C4.1.2, D2.4

The report summarizes the proceedings of an international conference on auditing and evaluation of government programs by professional audit groups either within the government service (such as the auditor general, the public accounts committee) or contracted to the government. The perspectives of auditors, legislators, and program managers are presented.

Considerable emphasis is placed on the comprehensive or value-for-money audit approach. The paper by Robinson describes the development of a value-for-money methodology based on the SPICE (Study of Procedures in Cost Effectiveness) program. This methodology was developed by a large group (60) of professionals from consulting, academe, and government working as 14 teams to examine specific management issues in individual organizations and also to develop a list of generic or government-wide management issues which affect value-for-money or cost effectiveness. Considerable effort was made to develop a useful classification of audit subjects. The paper describes both the procedures used to develop this evaluation methodology and the methodology itself. It is followed by a case study of a comprehensive audit of Canada Customs and, as an example of a government-wide issue, an evaluation of capital expenditures.

The entire report discusses approaches of interest and relevance to an AECB evaluation. In the conference's concluding remarks, J.J. MacDonnell describes a (then) new program called ASCAM (Advanced Studies in Comprehensive Auditing Methodology). When complete, the program would comprise an audit manual describing methods, an instruction course for professional personnel, and a book then tentatively entitled "Guidelines to Comprehensive Auditing as Developed and Applied in the Office of the Auditor General of Canada".

Chayes, A. & W.B. Lewis. 1977. International Arrangements for Nuclear Fuel Reprocessing. Ballinger Publishing Co., Cambridge, Mass.

C3.1, D2.7

This contains contributed chapters on nuclear proliferation, safeguarding and safety of reprocessing facilities, physical security of nuclear plants and the difficulties of making effective international institutional arrangements for the control of nuclear proliferation. The book is useful in defining issues for the evaluation of programs in the control of nuclear information and activity, but not for assessing methods of carrying out such evaluations.

Chubb, J.E. 1983. Interest Groups and the Bureaucracy. The Politics of Energy. Stanford University Press, California.

C4.1.3, D1, D2.1, E2

Chubb analyses the relationship between interest groups and the bureaucracy in the energy field. The chapter on nuclear regulation is of especial interest to the AECB. The methodology used is explained in great detail and it evaluates both the interest groups and the bureacracy.

The data source for the study is a survey of 73 interest groups active in United States national energy politics in the 1970's. A respondent specializing in executive branch liason was identified in each group and interviewed using a detailed questionnaire, which is provided. Details of the selection of samples is given in the appendix. A general theoretical framework for explaining relationships between interest groups and the executive bureaucracy is developed and propositions regarding these relationships are derived from this and tested by way of an overview of the political behaviour of the groups in the sample. This validates the theoretical approach used in the rest of the study. The theoretical model is integrated into the national energy policy-making system and gives a general basis for understanding the organizational relationships that underpin executive policy making, and for predicting conditions under which they are likely to change. It creates a manageable means of investigating and interpreting the complexity of energy politics.

Four case studies are described, these are nuclear regulation, oil price and allocation regulation, energy research and development policy making and national energy planning. Each study follows the same format : the relationship between the executive bureaucracy and the sample constituency of the 73 groups is described; the propositions generated by the theory are subjected to two types of tests - one evaluates explanations of group behaviour and the other explains bureaucratic behaviour; and bureaucratic behaviour over five years is studied.

Clark, T.B., M.H. Kosters and J.C. Miller III. (Eds.). 1980. Reforming Regulation. Conference Sponsored by American Enterprises Institute for Public Policy and Research and the National Journal.

C2, C3.1, C4.2.1, D2.4, D2.5, E1

The book contains a series of papers presented at a conference on regulatory reform : "Striking a Balance". The papers address the questions of whether idealism has reached beyond the bounds of practicality and whether government intervention in the private sector is damaging the free enterprise spirit in the United States. The book includes many papers which raise evaluation issues, of interest to AECB.

"The record on sunset review of two agencies", by Avery, lists five lessons learned from the process. These are : we should not expect too much from it; it needs a very long review period and is expensive; we can expect fierce interagency competition as it is a great opportunity for bureaucratic ambush; an agency with a sunset requirement maintains close liason with its oversight committee and attends its wishes slavishly; and an agency will try to use the process to improve its position.

In the section on "Regulatory Budget", a paper by Brown discusses proposed new Acts to control the regulatory budget, especially the Regulatory Control Act which would set an annual limit on the amount of private sector compliance costs. Mentioned are costs of environmental regulation of electric utilities which are passed on to consumers. Nader, in "Can a regulatory budget be calculated?", discusses the difficulties of calculating actual costs, seems to argue for the need for more regulation and mentions the limitations of the Regulatory Budget Act. Kristol argues for a regulatory budget to put an end to independent agencies' unlimited spending.

Breyer, in "The lessons of airline deregulation", notes four categories of regulatory change - procedures, structure, personnel or substance. For regulatory reform to work he suggests a substantive change would be most effective, as opted for by the Civil Aeronautics Board. For this to work an agency-by-agency approach is necessary, as detail is very important. Also a thorough study, guided by an overall framework is needed, with dramatic examples to gain media attention as this rouses constituency interest in the reform.

Weaver, in "Limits of cost-benefit analysis", uses Inhaber's (AECB) paper on risk analysis of various energy sources and the antagonistic reaction it received, to discuss the limitations of cost-benefit analysis where ethics are involved. Green, in "Cost-benefit analysis as a mirage" lists six problems with cost-benefit analysis. These are : that the regulated businesses always oppose the regulating agencies; benefits may be real but are not measurable; cost-benefit analyses to date have been one-sided, internal or narrow; they have serious methodological deficiencies; the tools are not available to conduct mathematically rigorous cost-benefit analyses ; and one has to think of the problems in the context of the campaign against regulation that is under way in the United States. Schuck, in "A tool for assessing social legislation", discusses cost benefit analysis in the context of three fundamental characteristics of the regulatory process : the overwhelming uncertainty attending regulatory decisions; the inevitable trade-off of one good thing against another; and the disparity of desires between the different members of a constituency.

Costle, in "The Environmental Protection Agency's initiatives", discusses EPA's response to the President's drive to improve efficiency of regulation, EPA's efforts in the area of cost benefit analysis of regulation and the work of the Regulatory Council. Eads, in "Reform through the Regulatory Analysis Review Group" discusses what the group does. Granquist, in "Role of the Office of Management and Budget" describes proposed new legislation of some aspects of Executive Order 12044 and gives an assessment of where OMB stands on regulatory reform. Crandall, in "Alternatives to the administration's initiatives", discusses what is wrong with the present reform system.

Colinvaux, P.A. 1982. Towards a Theory of History : Fitness, Niche and Clutch of Homo Sapiens. Journal of Ecology 70(2): 393-412.

C4.1.2, D2.3

Colinvaux brings an ecological perspective to the analysis of the aspects of human behaviour that determine how effective organizations can be. He begins with the premise that individual human beings seek a niche in society. This is analagous to the establishment of environmental niches by species of animals or plants. Individuals with little or no education or training are restricted to the narrowest niches : in other words, there are few occupations and fewer forms of leisure activity open to them. Individuals with increasing educational attainments and skills may occupy increasingly broader niches : that is, they are capable of a wider range of occupations, and a greater variety of leisure activity is available to them. They have the opportunity to lead a richer life.

The "broad niche" individuals are the driving force of society. There are too many of them for the relatively few places that society provides for people of their ability because mass education and a high rate of successful reproduction has added to their numbers. They want to create more suitable niches for themselves and their children so that they can lead satisfying lives :

> "There are only five different ways in which more high-quality niches can be found :
>
> (i) technical invention leading to complexity;
> (ii) trade;
> (iii) colonies (people export);
> (iv) empire building (wars of civilization); and
> (v) oppression."

Of these "technical invention leading to complexity" and oppression" are particularly relevant to the evaluation of regulatory programs. On technical innovation :

> "A major technical project provides jobs (niche-space) for engineers who build it and bureaucrats who administer it. It is an accidental consequence that, say, an irrigation system provides also large numbers of occupations for poorer people who become dependent on it."

And on oppression :

> "It is tempting to see oppression merely as a device to secure unequal shares, yet this may be the smaller part of the effect. The immediate result of starting oppression is work for the oppressors. Tyrannies need an apparatus of policemen and soldiers, thus providing supervisory niches at many different ranks in a class hierarchy, suggesting that there can be few more effective ways of accommodating surplus offspring of soldiers, policemen, or the bureaucracy. Oppressing the mass, therefore, should become an habit of ruling classes when other ways of employing their surplus numbers are exhausted. Police control in some countries may become a welcome casualty of affluence, therefore, as better occupations are found for policemen."

This is a more penetrating analysis of the growth of regulation than that offered, for example, by Stanbury (1980) or the Economic Council of Canada (1979), both of which are abstracted in this bibliography. It is relevant to program evaluations that, as the Treasury Board Guide (1981a) proposes, "Challenge the very need for programs and seek to explore alternative ways of achieving program objectives".

Colorado State University. 1975. Social Impact Assessment. An Overview. Prepared for the Institute for Water Resources (Army). United States Department of Commerce, National Technical Information Service.

C4.2.1, D2.1

This document is a first response of a team of social scientists to the challenge of providing an appropriate social sciences framework for impact assessment in the Corps of Engineers. It presents a general conceptual model for conducting social impact assessments. There are two key points made. The first is that because of the state-of-the-art and major disagreements between social scientists, it was impossible to arrive through consensus at agreed upon definitions, specific variables and particular social indicators and techniques for social impact assessment. Secondly, there is a need for inputs from authorities and by public participation to make possible the articulation of achievement of broad goals, such as enrichment of the quality of life. This document is relevant to AECB in evaluating the social impact of its programs, especially in view of the requirements of SEIA for new or significantly changed regulation.

The document consists of five parts. The introduction constructs a general conceptual scheme. The "human community", or profiling, section groups individuals with some interrelatedness and interdependence. Three aspects of human community are elaborated upon, the ecological, structural and cultural-phenomenological. The methods-analysis section deals with procedures and techniques for collection, organization, display and analysis of relevant data. It covers the important issue of data distortion and errors in inferences; the limitations and distortions of indices of quality of life; and the difficulties of predicting possible effects and evaluation of long-term consequences. Assessment and evaluation discusses the socio-political process of assessing and evaluating various project impacts, and the limits and constraints of the kinds of data collected. It relates a social impact assessment to the broader process of environmental and economic assessment.

Connor, R.F., D.G. Altman, & C. Jackson. (Eds.). 1984. Evaluation Studies Review Annual. Volume 9. Sage Publications.

A2, A3, A4, A5, A6, C2, C3.2, E2

This volume is another in a series of annual compendia of important recent papers on evaluation. In this volume, the editors stress the processes of evaluation and the multidisciplinary nature of the field. They see the steps in evaluation as :

1. adopting an evaluation philosophy or ideology;
2. learning about the specific program under study;
3. selecting a general evaluative approach;
4. developing a model of the program and its operations;
5. designing a model of the program and its operations;
6. developing sampling and measurement strategies;
7. analysing the data; and
8. disseminating and utilizing the evaluation results.

The various articles chosen for the volume are organized to illustrate these steps.

In an initial overview article, they describe recent trends in evaluation such as the apparent truce in the conflict over the superiority of quantitative or qualitative methods and new approaches dictated by leaner economic times.

In Part I of the volume, Scriven examines in detail current evaluation ideologies and deals with such topics as the relationship between the evaluator and program staff, the evaluative nature of science, the introduction of bias through shared self-interest on the part of the contract evaluator and program manager. House presents another philosophical approach to evaluation by describing its metaphorical nature and the various ways in which we think about evaluation and characterize it in our minds. These articles provide valuable background information for the design phase of an AECB evaluation.

Part II deals with what our review refers to as program description. The papers are socially-oriented and not of any particular relevance to AECB.

Several of the articles contained in Part III, dealing with the selection of general evaluation approaches, are pertinent to AECB. Weiss reviews "stakeholder-oriented" evaluations, which are aimed at increasing utilization of evaluation results and increasing fairness, by considering the interests and priorities of the people affected by the evaluation. Louis examines the use of multi-site/multimethod evaluations employing a variety of qualitative and quantitative methods to examine problems which appear not to conform to standard methods. Strube and Hartman discuss the techniques and applications of meta-analysis in instances where it is necessary (and possible) to integrate the results of several evaluation studies, and take stock of the state of knowledge of a problem.

Luckey et al. discuss the use of archival data and data derived from management information systems specifically designed to provide input to evaluation studies.

The article by Wortman reviews the principles, methodology, and utility of cost-effectiveness analysis. This article was taken from another paper reviewed here as Wortman (1983).

The paper by Chen and Rossi on program modelling in Part IV of the volume is of particular interest. Chen and Rossi advocate an approach based on pre-evaluation formulation of a detailed model of program processes, interactions and internal relationships, and external forces. They believe this methodology allows the evaluator to go beyond determining the success or failure of a program to discussing the reasons behind these conclusions. The applications are generally taken from the social sciences but the philosophical foundations of the approach have much broader application.

All sections of this volume contain papers of interest to an evaluation program designer. This volume is particularly useful as it is current and deals with present state-of-the-art approaches and methods. The only drawback for AECB is the emphasis on social program examples.

Cook, G.C.A. and Woods Gordon. 1981. Cost of Compliance Study: The Impact of Government Regulations on Business. 2 Vols. Regulation Reference. Working Papers Series No. 13 and 14. Economic Council of Canada.

C4.2.1, D2.4

The study was designed to provide evidence of the cumulative impact of goverment regulation on individual businesses, to establish the costs to business of compliance with government regulations, to identify areas of inefficiency as identified by companies, and to suggest reforms which might reduce the costs of achieving the social and economic objectives of government regulatory programs.

Volume 2 contains a detailed description of the methodology used in the study. Initially 200 companies were approached with a survey questionnaire. Of these, 10 were ultimately chosen from a range of industrial activities and a variety of case studies dealing with development of new facilities, products, or services, and the ongoing impact of a set of regulations. The study is particularly useful to AECB as a reference for general study design and development of questionnaires. Description and documentation of the actual case studies were done by the companies themselves in collaboration and under the direction of the study team.

The authors acknowledge that the appropriateness or success of regulation cannot be evaluated without a measure of the benefits of regulation to society. The study presents a methodology for addressing one half of this difficult problem.

Cottrell, T.J. 1980. The Administration and Regulation of Hazardous Waste for the Public Hearings on the Management and Disposal of Hazardous Waste. Environmental Council of Alberta.

B4.2

This is one of two bulletins prepared by the Environmental Council of Alberta, to provide information to the public in advance of province-wide public hearings on industrial waste management. This bulletin describes both the Alberta legislation applicable to the regulation of waste disposal, and the jurisdictional responsibilities of provincial agencies and municipalities. Requirements that must be satisfied before disposal facilities may be built are also described. This type of study is useful to AECB as an example of comparative analysis of regulation. It also shows where there is a need for a reduction in the number of departments and jurisdictions responsible, and a clarification of authority for effective regulation to be achieved. In addition, the subject of hazardous waste disposal is one of concern to AECB.

Courville, L. 1980. Responsible Regulation. Howe Research Institute. Observations # 22.

C4.1.3, D2.4

This report comments on the Economic Council of Canada's interim report "Responsible Regulation" which examined the reduction of the burden of government on the private sector and the elimination of overlapping regulatory jurisdictions. The Council's recommendations dealing with the relationship between regulatory agencies and government are thought to have struck the right balance between political control and regulatory independence. The recommendations dealing with cost-benefit analysis of regulations are not thought to have dealt with the source of the problems and therefore might not have the desired effect. The author feels that the Council should also have considered the issues of regulatory scope, regulatory budgets and deregulation. The report gives an independent perspective on the Economic Council of Canada report, and is an example of a legally based method of analysis. It is of interest to AECB in identifying generic evaluation issues.

Cowing, T.G. & R.E. Stevenson. (Eds.). 1981. Productivity Measurement in Regulated Industries. Academic Press.

D2.3, D2.5

The volume is a collection of papers discussing the theoretical foundations of productivity measurement in regulated industries (based on several approaches - microeconomic theory, econometrics, etc.) and then illustrating application of these approaches through 10 case studies.

All of the methods are mathematically and empirically based. Some are applicable to analyses of areas of the nuclear industry regulated by the AECB, and in particular to an analysis of the economic impact of regulation. The paper by Kopp & Smith gives an engineering-econometric analysis for productivity measurement to examine the implications of environmental regulation. Aivazian and Callen uses a simulation approach to compare capacity expansion in the Natural Gas Industry in a regulated and non-regulated environment. Friedlaender, Spady and Wang Chiang discuss the relationship between regulation and trucking costs on productivity in the industry. Crandall discusses pollution controls and productivity growth and argues that environmental policy has been designed in a manner that has deleterious effects on economic growth beyond its direct effect of mandating resources for pollution control. These are areas of specialist endeavour and the models and processes described in the volume are sophisticated, complex, and in many cases, based on computer modelling solutions to problems.

Dale-Johnson, D. 1981. Greater Vancouver Regional District Land Use Study : An Evaluation of the Land Use Approval Process in Coquitlam, Surrey, and Vancouver, 1979. Regulation Reference, Working Paper Series No. 15. Economic Council of Canada.

B4.2, C4.2.1, D2.4, D2.5

The study is one of four done in major urban areas in Canada to evaluate the impact of land-use regulation on land development. The paper provides an example of an evaluation undertaken in response to a detailed and specific set of questions predetermined by the authority commissioning the evaluation. The use of the same set of questions for each study limits the scope of the evaluation to those areas of commonality in the four settings and to those areas the commissioning authority wishes discussed. It also limits the examination of the underlying principles of regulation. The paper investigates the costs of regulation to the industry and the way in which these costs are or are not borne by the public. It also discusses the difficult problem of quantifying the benefit to the public of the regulation of land-use, but makes no attempt to do cost-benefit analysis in the traditional sense. Rather, it evaluates the cost-effectiveness and success of different approaches to land-use regulation within three Metro Vancouver municipalities which attempt to achieve similar goals by different applications of the same enabling legislation.

This paper provides an example of the question-based approach to evaluation and also discusses a problem potentially faced by AECB in its evaluation : how to quantify the benefits of government regulation.

Davis, L.T., T.J. Mazour, and R. Zaret. 1981. Analysis, Conclusions, and Recommendations Concerning Operator Licensing. Analysis and Technology Inc. for USNRC, NUREG/CR-1750.

D1

The paper is the report of an independent study of requirements and practices regarding the selection, screening, training, licensing, requalification, and performance of nuclear power plant licensed operators. Standard investigative techniques were used, including document review, personal interviews, the development, use and analysis of job satisfaction questionnaires, and statistical analysis of historical job-related data. The methodology is discussed in some detail, particularly in relation to development of analytical tools for the study. Comparisons are made between NRC and industry practices and those of foreign civilian and U.S. Navy nuclear programs and the Federal Aviation Administration.

The paper provides a useful background reference for evaluation of the equivalent AECB program and the analytical techniques have broader application to a wide range of personnel-related assessments.

Denton, H.R. (Chairman). 1977. Nuclear Power Plant Licensing: Opportunities for Improvement. NRC. NUREG-0292. Washington.

C4.1.2, D1

The document is the report of a study group set up to investigate time and manpower expended on the safety and environmental review aspects of nuclear power plant licensing. Standard methods were employed. Fourteen licensing applications were reviewed and interviews were conducted with staff members to determine the sources of major or frequent obstacles and difficulties in the licensing process.

The recommendations of the group emphasized the need to reduce the incidence of litigation brought by public interest groups, largely through increased "rule-making" and improved documentation and legislation of the regulatory process. They also emphasized the need to improve the quality of initial applications through greater pre-tendering consultation and guidance. These recommendations apply particularly to the U.S. system and regulatory style but the methodology is transferable to the AECB context.

Dewees, D.N. 1980. Evaluation of Policies for Regulating Environmental Pollution. Economic Council of Canada Working Paper #4.

C4.1.3, D2.1, D2.5

This report deals with alternative approaches to environmental regulation, and in particular pollution control. It focusses on the choice between direct regulation and market mechanisms, or some combination of both. It uses published works by economists and political scientists and discussions with government and industry representatives as a basis for the study.

A brief review of current environmental policies and problems is given. The objectives of the different groups influencing the passage of legislation and implementation of policies is analysed. Economic arguments for market oriented environmental policies are reviewed and evaluated. These are effluent charges in which a price is set for each unit of pollution, a mixed approach where a polluter failing to comply with regulations is subjected to a fixed charge, and effluent rights whereby an agency specifies the maximum pollution emission allowed and issues rights for a specified amount of emission. The fate of the previous policy proposals, measurement problems, financial impact and an assessment of objections to market policies is given. Finally, conclusions and possibilities for reform are given. This report discusses economic criteria for evaluating regulatory methods. It would be useful to AECB in defining evaluation questions and examining alternative ways of achieving program goals.

Dixson, E. 1984. A Communications Audit of the Northern Pipeline Agency. Prepared for the NPA.

D2.3

The report is of a communications audit of the Northern Pipeline Agency focussing on internal communications between the staff, and on the changes in communications patterns expected after the project was put on hold and staff reduced. Data were collected from interviews, starting with the Chief Operating Officer and followed by personnel from each level of the organization. The questionnaire that was used is included in the appendices. It was formulated using background information from the interview with the Chief Operating Officer and a list of suggested questions for communications audit proposed by Gerald Goldhaber (see this bibliography). It would be useful to AECB if the Board were to undertake a similar evaluation.

Doern, G.B. 1982. The Politics of Risk : Identification of Toxic and other Hazardous Substances in Canada. Study for the Royal Commission on Matters of Health and Safety Arising from the Use of Asbestos in Ontario.

C2, C3.1, C4.2.2.1, D2.1, D2.6.2

This background study examines from a political perspective the question of risk and risk assessment associated with hazardous materials in Canada. It tries to answer such questions as "How and why do certain hazardous substances get on the political agenda and others do not?" and "Are there better ways in which Canadian society and its political institutions can learn about and understand the nature and probablility of the numerous risks we face, so as to deal with the most important risks first?"

The report looks at how risks are identified in Canada by examining 16 diverse case studies, including radiation at Elliott Lake. It goes on to look more closely at asbestos-related risks, particularly those associated with use of asbestos as insulation in schools.

Of most relevance to AECB is the discussion of the gulf between the public's perception of a risk and the real extent of the hazard and the influence that this perception has on the allocation of resources for health and safety. The paper is of use to AECB in highlighting the political and popular influences on risk assessment.

Doern, G. B. 1979. Rationalizing the Regulatory Decision-Making Process : The Prospects for Reform. Regulation Reference. Study Prepared for the Economic Council of Canada.

B3, C4.1.3, C4.2.1, D2.1, D2.2, D2.5

This study describes the process through which regulatory decisions are made and evaluated in Canada's 11 senior governments.

There is a discussion of the relationship between regulatory reform, the theory of regulation, the nature of governing instruments, decision processes and the modes of organization as they function in Cabinet Parliamentary Government. Doern gives a general profile of current trends in regulatory practices, traditional legal aspects of regulatory decision-making and evaluation. He also describes recent experiments in the prior evaluation of proposed new regulations, especially in the federal government. The SEIA program is discussed providing an understanding of its objectives, the main features and methodologies. He describes general methods of social and economic impact analysis, and legal, financial and political evaluation. Some methods are applicable to existing legislation. Observations and conclusions are made on the potential for new regulatory decision procedures.

This book is important to AECB in providing analytical descriptions of Canadian regulatory processes. It also identifies and discusses issues arising in the drafting of regulations and the making of regulatory decisions. Traditional and recent reforms are reviewed against alternative instruments such as taxation, government spending and simple exhortation.

Doern, G.B. 1978. Science and Technology in the Nuclear Regulatory Process : the Case of Canadian Uranium Miners. Can. Public Admin. 21(1):51-82.

C4.2.2.1, D1, D2.2, D2.6.1, D2.6.3, D2.7

Doern examines the role of science and technology in the nuclear regulatory process using the example of the poor record of regulation of the health and safety of uranium mine workers. He discusses the unusual aspects and characteristics of the uranium cycle regulatory process and the nuclear industry which prevent the most beneficial use of scientific information. These include : hypotheticality (standards of proof and risk-benefit cannot readily be established because much of the nuclear regulatory process deals with issues which lie in the realm of the hypothetical); the style of regulatory process (open versus closed model); the fact that scientific research priorities are not focussed on areas of regulatory concern but rather on basic nuclear research; standards often originate outside Canada and these may have been established subject to trade-offs and compromises which are not acceptable in Canada; and the characteristic periods of expansion and decline in the uranium mining industry have not been conducive to the training and maintenance of a stable work force and safety has suffered as a result.

The paper is a hind-sight evaluation of a regulatory process which, according to Doern, has failed in many respects. Doern uses his extensive knowledge of the atomic industry and its regulatory process, and the results of the Ham and Beaudry Commissions, to analyse the state of regulation in this area. He discusses standard-setting and compliance processes and suggests reforms in many of these areas. Both the methodology and the content are of interest to AECB.

Doern, G.B. 1977a. The Political Economy of Regulating Occupational Health: the Ham and Beaudry Reports. Can. Public Admin. 20(1):1-35.

C2, C3.1, D2.1

The article examines the content and findings of the report of the Ham Royal Commission on the Health and Safety of Workers in Mines and the preliminary report of the Beaudry inquiry into health in the Quebec asbestos industry. The reports are analysed in relation to a case study (Matachewan asbestos plant) and in the broader context of the main variables in the political economy of regulating occupational health. The methodology follows that of standard academic inquiry and analysis and is, in fact, an evaluation of past regulatory practices in the area of occupational health and safety. Doern's analysis suggests that the factors of greatest importance in explaining past regulatory failures have been the raw economics of regulating occupational health and interdepartmental jurisdictional conflict. He concludes that the two inquiries reinforce the need to link policy with adminstrative behaviour and to relate both to the Canadian industrial system. The paper is similar in its approach and content to Doern (1978).

The methodology is of less interest to AECB than the subject matters of the report, as in many ways it is, or reports on, an evaluation of the regulatory responsiblities of AECB in the area of health and safety.

Doern, G.B. 1977b. Regulatory Processes and Jurisdictional Issues in the Regulation of Hazardous Products in Canada. Science Council of Canada Background Study, No. 41.

B4.2, D2.2

The paper is a background study describing and analysing the Canadian regulatory process and the jurisdictional issues involved in the control and regulation of six long-term hazards in Canada, among them radiation. The study was designed to provide the Science Council of Canada with an understanding of how regulatory processes work, what social, economic, and political forces are involved, and how they interact.

The report describes the political economy of regulation in Canada, the federal-provincial and interdepartmental and interagency jurisdictional issues which arise, the regulation-making and standard-setting processes, and ways of improving all aspects of hazardous product regulation. The six hazards identified are examined by case studies. The chapter on radiation includes a description of AECB, its legislative mandate, policies, organization, etc.

The paper is an excellent overview of the regulatory environment in Canada and examines jurisdictional and public participation issues. It uses standard methods of inquiry and is, in part, an evaluation of the work of AECB.

Doern, G.B. 1976. The Atomic Energy Control Board. An Evaluation of Regulatory and Administrative Processes and Procedures. Prepared for the Law Reform Commission of Canada.

B4.2, C3.1, C4.1.1, C4.1.3, D1, D2.1, D2.2, D2.7

This study describes and assesses the regulatory and administrative procedures of the AECB. The policy background and mandate of the AECB is described and analysed to the extent that it affects processes and procedures, but is not the main concern of the study. Included in the analysis are general decision-making by the agency, its senior staff and advisory committees; regulation-making; licensing and related procedures; allocation of grants; compliance; and public information. AECB processes are evaluated against general tenets of openness and procedural fairness, and regulation-making is examined in terms of effectiveness of consultation with, or participation by, affected publics. Public information components of regulation-making, licensing and compliance processes are also examined.

Research methods included examination of public documents and internal reports, interviews with AECB staff, federal and provincial officials, industrial spokesmen and concerned individuals. To augment this, three case studies were carried out dealing with different aspects of AECB activities. These were the Lepreau Case - a study of the licensing process, the Uranium Mining Safety Case - a study of regulation-making and compliance processes, and the Nuclear Powered Pace Maker Case - a study involving regulation-making and licensing for a novel nuclear technology difficult to control or monitor. Concluding observations and suggestions are offered regarding nuclear regulatory processes. Reading this study would help an evaluator to understand the processes and procedures of AECB, and to identify evaluation issues.

Doern, G.B., I.A. Hunter, D. Swartz and V.S. Wilson. 1975. The Structure and Behaviour of Canadian Regulatory Boards and Commissions : Multidisciplinary Perspectives. Can. Public Admin. 18(2): 189-215. (also appears as a report to the Law Reform Commission by the School of Public Administration, Carleton University, Ottawa).

B3, B4.2, C3.1, C4.1.2, D2.2

The paper describes a multi-disciplinary approach to the study of regulatory agencies in Canada. It begins by examining the relevant areas of interest and inquiry pursued by the disciplines of political science, law, economics, public administration, and organizational behaviour. These diverse approaches are then synthesized and a multi-disciplinary method is illustrated by a diagram showing the factors and influences determining and affecting agency behaviour.

The value of this paper to an AECB evaluation lies in the definition of the various lines of approach open to the evaluator, the questions and results likely to be produced by any one discipline, and in the analysis of the factors influencing behaviour. In its conclusions, the paper suggests that multi-disciplinary evaluations are most likely to provide the flexibility necessary to study diverse regulatory boards and agencies such as AECB.

Doern, G.B. and A. Maslove (Eds.) 1979. The Public Evaluation of Government Spending. Montreal Institute for Research on Public Policy.

A3, D2.3, E1

The volume is a collection of papers presented at a 1979 conference on "Methods and Forums for the Public Evaluation of Government Spending". The book focusses on the assessment of the prospects for public expenditure evaluation and the identification of key areas for reform of current practices.

The papers presented deal with the environment of evaluation in the Canadian government - the internal disincentives to program evaluation, the influences of the political system in which "opposition for opposition's sake" seems to prevail, the perceived threat to departmental "raison d'etre", the potential for internal disharmony, and the public's perception of bureaucratic growth. Different budgetary systems and the built-in resistance to change inherent in program by program evaluation are discussed.

The papers are practical and based on the problems of program evaluation in Canada in the 1980's. The emphasis is away from the theoretical and towards the operational problems associated with evaluation in government. Several approaches are suggested to the solution of some of these problems including sunset laws, zero-based budgeting, etc.; many of which have been shown subsequently to have their own drawbacks. The collection of papers is a valuable general reference on approaches to evaluation, and a useful source of information for the evaluation designer in avoiding some of the pitfalls illustrated by past experience.

Doern, G.B. and R.W. Morrison, (Eds). 1980. Canadian Nuclear Policies. Montreal Institute of Research on Public Policy.

C3.1, C4.2.2.2, D2.1

The volume contains 16 papers (and several technical appendices) presented at a conference on Canadian nuclear policies held in late 1978. The conference was organized to provide a forum for discussion and critical scrutiny of controversial issues and policies in the development and use of nuclear energy in Canada.

The papers deal with a wide range of subjects including the political and economic implications of Canadian nuclear policies, foreign policy considerations, and domestic policy in such areas as waste management, occupational health, federal-provincial relations, nuclear controls and licensing, and new technologies. The papers present widely divergent views on nuclear energy in Canada.

Both the content and methodology are of interest to AECB and certainly represent a cross-section of informed opinion and expertise on topics in some areas directly related to the mandate of AECB. In some cases, papers present evaluations of regulatory performance in areas of AECB regulatory responsibility, particularly with regard to waste management and health and safety.

Doern, G.B., M. Prince, & G. McNaughton. 1982. Living with Contradictions : Health and Safety Regulation and Implementation in Ontario. Study Paper for the Royal Commission on Matters of Health and Safety Arising from the Use of Asbestos in Ontario.

B4.2, C4.2.2.1, D2.1, D2.6.1

The report attempts to describe the philosophy and actual procedures of standard-setting, implementation, and enforcement in health and safety regulation - focussing on Ontario. The study was designed to provide a full understanding of current regulatory processes for decision-makers faced with conflicting demands for regulatory reform, either through increased government intervention or deregulation. The study is a companion and extension to Doern (1982) on the identification of hazards in Canada.

The report covers regulation in the areas of the environment, labour and buildings and deals with both federal and provincial areas of responsibility. Recommendations for reform are contained in the concluding remarks.

Information was compiled from the hearings of the Royal Commission using standard investigative techniques. The study is an example of the descriptive step in evaluation, but goes further in many areas and assesses the success and failure of policies and practices based on past experience and incidents. It is a particularly valuable summary of practices associated with standard-setting in Canada and provides useful background information and case study examples for AECB.

Dohan, M.R. 1977. Economic Values and Natural Ecosystems. In C.A.S. Hall and J.W. Day Jr. (Ed's) : Ecosystem Modelling in Theory and Practice. John Wiley and Sons, NY.

D2.4

This paper reviews the application of cost-benefit analysis to natural resource management and environmental protection. The difficulties of such cost-benefit analyses are emphasized. The analyst has to identify all alternative courses of action (including doing nothing), estimate the monetary costs of all the alternatives, estimate the economic value (benefits) of all the alternatives and select the most valuable. This paper is of relevance to those AECB programs which have an impact on the environment, such as the siting of nuclear installations and mining.

Domaratzki, Z. 1984. CANDU Containment Systems - A Regulatory Perspective. AECB Info. 0137. Ottawa.

B4.2, C3.1, C4.2.2.2, D2.6.2, D2.6.3

The report is a hindsight evaluation of current practice. It identifies problem areas in present regulatory procedures and licensee operating and safety procedures related to potential failure or accidental release of radiation or fission products. The analysis is based on operating and accident reports from Canadian nuclear power plants. The paper explains current practice in the light of one of the founding precepts of nuclear regulation - the need to provide protection from extremely improbable events.

Dory, A.B. 1982. The Regulatory Process for Uranium Mines in Canada - General Overview and Radiation Health and Safety in Uranium Mine and Mill Facilities. AECB. Paper Presented to the Uranium Inquiry, Nova Scotia.

B4.2

The paper explores the issues of radiation and tailings disposal and then examines the Canadian nuclear regulatory process from the point of view of jurisdiction, objectives, philosophy and mechanics. The compliance inspection program is outlined and the relationship between AECB, other regulatory agencies, the public, and uranium mine-mill workers is discussed. Briefly mentioned are new regulations being drafted, the regulatory approach at the surface exploration stage, observations and findings of other uranium mining inquiries and future requirements in the industry's interest. This is a factual paper describing what the AECB does in respect to the regulation of the uranium mining industry, and would be useful for anyone evaluating that part of AECB's program.

Ebbin, S. and R. Kayser. 1974. Citizen Groups and the Nuclear Power Controversy : Uses of Scientific and Technical Information. MIT Press, Cambridge, Mass.

C4.1.3, D2.1

This is a report analysing citizen input into the nuclear power siting controversy by looking at the public hearing process. The AEC licensing and rule making procedures are given and case studies are described. It analyses and interprets the procedures, the role of lawyers, atomic safety and the licensing board, the role of citizen groups, science and scientists and citizen groups, other parties to the hearings and the role of the AEC. The authors make recommendations for improvements. Although AEC has been replaced by NRC and procedures have been changed, the report could be useful in evaluating AECB practice in the area of public participation and plant siting.

Economic Council of Canada. 1981. Reforming Regulation. ECC.

A3, B3, C2, C4.1.3, C4.2.1, D2.5

This is the final report by the Economic Council of Canada on economic regulation in all levels of government. It sets out to analyse the assortment of regulations facing Canadians. The pressures for regulatory intervention in this century are examined first and then factors and conditions that have rendered the competetive mechanism ineffective or inappropriate, and the regulatory instruments used to make certain activities more efficient or humane are discussed. Several areas of regulation are examined and analysed : economic markets that have been traditionally highly regulated (transportation, airlines, telecommunications and agriculture); regulations concerning common property resources (tidal fishing and environmental issues); and social regulations (health and safety). A perspective on the costs of regulation and business performance is given with the aid of ten case studies. Finally, "Lessons and guidelines for policy" addresses the issue of identifying public interest and funding public interest groups. Many recommendations for regulatory reform are given.

Together with the Interim Report, "Responsible Regulation", this is a useful guide for identifying evaluation issues, choosing appropriate questions to ask when evaluating regulation and identifying alternative approaches to achieving regulatory goals.

Economic Council of Canada. 1979. Responsible Regulation. An Interim Report. ECC.

A3, B3, C2, C3.1, D2.4, D2.5, E1, E2

This is the interim report by the Economic Council of Canada on economic regulation in all levels of government. It was commissioned by the Conference of First Ministers. The authors consulted several committees on regulation, trade unions, the Consumers Association of Canada and business executives.

Firstly, private sector concerns about regulation are discussed. The scope and growth of regulation and methods and difficulties of measuring its effects are described. Three areas for analysis are identified : impact of regulatory activities on the integration of the economy; increased costs incurred in the private sector due to overlap, duplication and conflict; and costs to the government arising from the same concerns.

"A framework for analysis" goes into these questions in more detail. It discusses values and value premises in defining criteria for evaluating the regulatory process. It reviews regulatory issues and offers opinion about what are the right questions to ask. It also mentions assessing the economic impact of regulation, and discusses how to determine how much regulation is enough.

Types and rationales of regulation affecting economic activity are discussed and three basic values are identified for reviewing these : efficiency, equity and individual freedom. Some simple, but important, questions to consider when evaluating regulation are set out. A range of problems associated with the regulatory process and management are analysed and options available to remedy situations are discussed and recommendations offered.

This report would help in evaluating existing and proposed regulatory programs such as those of AECB. Identification of issues, framing of questions, economic impact of program activities and alternative methods of achieving regulatory objectives are all addressed.

Eichholz, G.G. 1976. Environmental Aspects of Nuclear ower. Ann Arbor Science Publishers Inc.

C3.1, C4.2.2.1, D2.4, D2.6.2, D2.6.3

Eichholz offers a technical review of the environmental implications of the nuclear power industry. His purpose is to acquaint scientists and engineers with the subject. His viewpoint is that of the responsible nuclear engineer who balances environmental protection against the need for power sources. The book would be especially useful in evaluating the technical aspects of AECB's program.

The first chapter considers the reason for the growing adoption of nuclear energy as a primary energy source, some of the social implications of steadily increasing energy consumption, those aspects of the environment likely to be affected by nuclear technology, and the nature of the effects being considered. It does not deal with regulatory and legal matters in any detail. The following chapters discuss the various factors involved in the environmental aspects of the nuclear power industry.

The environmental impact of nuclear power resolves itself into three major components : (i) the effect of a large amount of heat released at a given location in the surrounding ecosystem; (ii) the hazards associated with the contained radioactive materials in reactor fuel, and population exposure to low-levels of radioactive contaminants from plant effluents; and (iii) the overall impact on neighbouring areas of selecting a specific power plant, in terms of land-use, powerline locations, transportation routes, aesthetic and recreational factors and economic benefits. The book attempts to balance and assess these various factors and tries to explain the problems involved and some of the current procedures in use.

There are chapters on the passive environment, the dynamic environment, radiation effects, nuclear power plants, waste heat dissipation, treatment of radioactive effluents, environmental dispersion of radioactive effluents, power plant siting, transportation of nuclear materials, the fuel cycle industries, radioactive waste disposal and technological assessment. Cost-benefit optimization, risk benefit assessment, energy balance assessment and environmental impact methods are also reviewed.

Emmett, B. 1975. Environmental Applications of Input-Output Analysis. Environment Canada Planning and Finance Service Report #3.

D2.5

This is a technical and theoretical paper assessing the applicability of input-output analysis to environmental effects of industrial activity. It uses five different types of input-output analysis models to examine the interrelationship between economic activity and the production of residuals. It would be useful to those defining economic evaluation criteria for, and seeking methods of measuring impacts of, programs of which environmental protection forms part.

Englehart K. and M. J. Trebilcock. 1981. Public Participation in the Regulatory Process. The Issue of Funding. Economic Council of Canada Working Paper # 17.

C4.1.3, D2.1

This study examines the case for public subsidization of the costs of participation by public interest groups in the regulatory process. It argues that some groups are underrepresented - those groups where the aggregate interest is large but the individual interest is small. This inhibits input. The authors explore the advantages and disadvantages of public subsidization of groups to redress these imbalances. Funding mechanisms are evaluated, these are : cost awards by regulatory agencies; government advocacy offices; staff counsel to regulatory agencies; direct government grants to interest groups; and tax incentive schemes. This paper would be useful to evaluators of the public participation program of AECB.

Engstad, P. and M. Lioy (Eds). 1980. Report of the Proceedings - Workshop on Police Productivity and Performance May 25-26, 1977. Law Enforcement Section, Programs Branch. Ministry of the Solicitor General of Canada.

D2.3, D2.7

The volume is a collection of papers presented at a two-day workshop set up to examine recent approaches to the measurement of police productivity and performance in Canada, Great Britain, and the United States.

The papers address the difficult problem of defining indicators of police performance and productivity, the equally difficult problems of measuring those parameters, taking into account the public's perception of safety, security, and crime control, and the often conflicting elements inherent in effectiveness and efficiency in the case of many services.

Major papers on current methods and research are presented by participants from each country. Needles' paper presents a flow chart model of objectives and measures of effectiveness and productivity for each major area of police responsibility and is quite useful as an example of the breakdown of complex responsibilities into a manageable format.

The volume provides a useful discussion of approaches to an evaluation problem which is analagous to AECB's. Both agencies face diverse responsibilities in an area of high public interest, fiscal restraint, and the conceptual and real problems of definition and measurement of their performance.

Environmental Resources Limited. 1983. Environmental Impact of Future Coal Production and Use in the EEC : A Report. Prepared for the Commission of the European Communities, Directorate General for Environment, Consumer Protection and Nuclear Safety. Graham and Trotman. London.

C4.2.1, D2.5, D2.6.2

This study predicts the level of coal consumption in the European Economic Community between 1980 and 2000. It analyses how this demand might be met by indigenous coal production, and what the level of pollution and environmental impacts from the changed coal consumption are likely to be. Finally it compares alternative means of using coal with traditional methods. The emphasis of the report is on how the physical environment will be altered by these changes in coal consumption. There are sections on mining and impacts of subsidence, mine waste, drainage, preparation plants and dust. Impacts of air pollution generated by coal combustion, including health and environmental effects are covered, as are water pollution and problems of disposal of solid wastes.

This paper would be useful to AECB in scientific and technical areas, as it reviews areas of concern similar to those of AECB such as environmental protection and health hazards. It could help develop technical and quality control criteria for program evaluation. The methods of predicting future impacts could be useful in evaluating program impacts and reviewing alternative methods of achieving program objectives.

ESSA. 1982. Review and Evaluation of Adaptive Environmental Assessment Mangement. Environment Canada.

B4.1, C3.2, C4.1.2, D1, E2

Adaptive Environmental Assessment and Management (AEAM) is a collection of concepts, techniques, and procedures which together constitute a distinct approach to resource management. The standard text of its school of practitioners is Holling (1978) : "Adaptive Environmental Assessment and Management", John Wiley & Sons. Essentially the method consists of using comprehensive workshops to develop a systems model of what is being managed and of the process of management, including regulation. The model enables identification of issues that require resolution and of problems that impede the existing system. It also provides a vehicle to investigate possible changes. The approach has obvious application in identifying evaluation criteria, especially with respect to resource management and environmental matters.

The evaluation cited here was done in three stages : (i) a workshop which brought together practitioners, users and senior policy designers; (ii) case studies by both practitioners and users; and (iii) a synoptic analysis of AEAM procedures, literature and case studies. It is a useful example of identifying elements of a management or regulatory program to be evaluated and criteria for their evaluation. Although the evaluation was conducted objectively, the fact that the authors are advocates and practitioners of the method is evident in their interpretation. Nevertheless, the report provides a rare example of the integration of the results of evaluation to diagnose the weaknesses of what is essentially a regulatory process. It is particularly useful in addressing what limits efficiency and effectiveness and obstacles to the innovation necessary to improve them. These items are all of potential value to AECB.

FEARO. 1980. Report of the Environmental Assessment Panel. Eldorado Uranium Refinery R.M. of Corman Park, Saskatchewan. FEARO 13. Government of Canada.

C4.1.3, D2.1, D2.2, D2.6.3

The Environmental Assesment Panel reviewed a proposal by Eldorado Nuclear Ltd. to construct a uranium refinery in the Rural Municipality of Corman Park. The main input to the review was Eldorado's Environmental Impact Statement which was based on previously issued guidelines. The Panel solicited comments on the EIS from the public and technical agencies, and held public meetings near the site. The issues considered were related to the need for the project, potential impact on the physical and human environment, and project monitoring. Conclusions, rationales for the conclusions, and recommendations are given. Appendix II discusses the procedure of the review and suggests improvements to the process.

This is an example of public participation in evaluation of a topic directly relevant to AECB.

FEARO. 1979. Report of the Environmental Assessment Panel. Eldorado Uranium Hexafluoride Refinery Ontario. FEARO 8. Government of Canada.

C4.1.3, D2.1, D2.2, D2.6.3

The Panel reviewed a proposal to construct a uranium hexafluoride refinery at one of three sites in Ontario. It reviewed the suitability of the three proposed sites and reexamined the plant processes in the context of possible damage to the environment. Public hearings were conducted for the Panel to learn all concerns and hear all points-of-view in detail; the sites were inspected; and briefs submitted to the Panel. The concerns about the construction of a refinery and Panel recommendations are given. These would be of interest to AECB staff evaluating the siting process.

Felske, B.E. and Associates Ltd. 1981. Sulphur Dioxide Regulation and the Canadian Non-Ferrous Metals Industry. Economic Council of Canada Report # 3.

B4.2, C4.2.1, D1, D2.4, D2.5

This is a broad-ranging study of the non-ferrous metals industry in Canada and the cost-of-compliance to the industry of present regulations on acid deposition control.

The report is comprehensive. It describes the non-ferrous metals industry in Canada, the environmental cause and effect relationships of sulphur dioxide, technological alternatives to sulphur dioxide control, and the sulphuric acid market available to dispose of by-product sulphuric acid. The discussion of cause and effect relationships is followed by an analysis of the feasibility of applying cost-benefit techniques to regulation development for the industry. Of particular interest is a discussion of the infeasibility of cost-benefit analysis when environmental effects are involved. The authors attribute this to the lack of information about such effects and the difficulty of attributing value to what is affected. This aspect of the study is relevant to the AECB program as it illustrates application of these techniques (although essentially qualitatively) to a technically complex set of circumstances. The report analyses the costs of regulatory compliance for all sectors of the industry and uses case studies to assess the economic effects of compliance on individual mines and smelters. It examines the international character of the industry and its market, and the external competitive pressures on the industry. Brief mention is made of the regulatory problems arising from overlapping federal and provincial control. No analysis is made of regulatory techniques and alternative approaches to regulatory objectives as the study is largely prospective. Recommendations are made for future regulatory and policy action at the federal level affecting all aspects of the industry.

The study uses standard techniques of inquiry and applies economic analyses to assess various methods of assigning the costs of sulphur dioxide control to the industry. It is an extremely comprehensive report, dealing with the economic, social, and environmental effects of regulation and provides a useful model for similar studies.

Ferguson, A.R. (Ed). 1981. Attacking Regulatory Problems - An Agenda for Research in the 1980's. Ballinger Publishing Co.

C3.1, C4.1.3, C4.2.1, D2.4, D2.5

The volume is a collection of papers presented at a 1979 conference on regulatory research in the U.S. in the 1980's. Three major research areas are identified - assessment, information, and institutions.

"Assessment" (or evaluation) is of direct interest to AECB evaluation; most of the chapter deals with the regulation of health, safety, and the environment. Five chapters provide suggestions for research on the costs and benefits of regulation. Dorfman discusses transition costs - the costs incurred as a result of changes in regulations or regulatory philosophy. These include actual monetary costs, as well as the less easily quantified uncertainty raised in the minds of the regulatees, and such social costs as the displacement of workers. Eads and Harrison suggest research is needed on the cumulative effects and aggregate costs of a multitude of regulations on firms and industries. Discussion is also included of the difficulties of benefit estimation in regulated areas of health, safety, and the environment. Vaupel expands on this topic and devotes an entire paper to research priorites in the study of benefits of health, safety, and environmental regulation. Both Eads and Vaupel recognize the inherent limits associated with monetary valuation of benefits and suggest that emphasis in research be placed on measuring the "likely actual outcomes of regulation where those outcomes are expressed in measures other than dollars". Fisher's article touches on several issues in cost-benefit estimation though he focusses on research into compliance, means of obtaining reliable information on compliance costs, and ways of enforcing and monitoring compliance.

The papers dealing with information also have relevance to AECB. Bartlett examines the problems associated with making regulatory decisions based on information provided by the regulatee and the inherent biases introduced, and suggests policy options to improve the flow of information between regulators and the regulated.

On the third broad topic - institutions - Magat's article raises important questions about the organization and decision-making behaviour of regulatory agencies. He concludes that more basic research into the regulatory process, its priorities, rule-making, enforcement, and evaluation procedures is necessary.

This is a useful reference. It highlights problems and areas of current research from which AECB could benefit in designing its evaluation program. It may point to new approaches, particularly in the area of cost-benefit estimation, that would be particularly applicable.

Finsterbusch, K. 1980. Understanding Social Impacts - Assessing the Effects of Public Projects. Sage Library of Social Research 110. Sage Publications.

C4.2.1, D2.1

The volume is a summary of existing knowledge about social impact assessment, and is designed as a resource book for social impact assessors. The impacts of most concern include the impacts of large public construction projects and would therefore be of interest to AECB evaluators assessing the impact of construction of a nuclear installation. The book examines eight impact areas : population changes, employment changes, displacement and relocation, neighbourhood disruption, noise impacts, leisure/recreation impacts, stressful community growth, and community decline. Each chapter summarizes the available and relevant knowledge, discussing the impacts of projects and explaining the more general phenomena involved in each impact area. Land-use, accessibilty and citizens reactions are covered briefly. Aesthetic and health and safety impacts are not included.

Fisher, A.C. 1981. Resource and Environmental Economics. Cambridge Univ. Press.

D2.4, D2.5

This book was written in response to the explosion of interest in resource and environmental issues. It covers both issues equally, trying to maintain an unbiased balance between the two. Concerns motivating economic investigations are dealt with - such as "Are we running out of key resources?" and "What are the benefits of various proposed environmental programs?" The author stresses the economic logic, and sometimes the policy implications, of the situations he discusses.

The author first discusses the optimal depletion of non-renewable resources and develops a basic theory. The behaviour of resource cartels such as OPEC, the effects of different kinds of uncertainty on patterns of depletion, and intergenerational problems are all covered in this chapter. The author next extends his theory to treat renewable resources and discusses managing stocks. In the following chapter he discusses the behaviour of extractive-resource costs and prices, describes some indicators of scarcity and reviews recent findings on substitutionality of oil, gas and coal.

Environmental issues are covered next. In situ resources in the natural environment are discussed and how to apply cost-benefit analysis to environmental values in such situations is considered, with the aid of a case study. The economics of pollution control is explored. The treatment includes attaining efficiency in the presence of pollution externality, and different policy instruments for pollution control. The author then looks at how to measure benefits and costs of control with estimates taken from other studies. The final chapter reflects on the contributions of economics to the understanding of resource and environmental issues and the formulation of policies.

The methods of determining economic impacts of resource management and regulation are applicable to evaluation of the effects of AECB's programs.

Flesher, D.L. and S. Siewert. 1982. Independent Auditor's Guide to Operational Auditing. J. Wiley and Sons.

A6, C4.1.2, D1, D2.4

Although operational auditing differs from program evaluation in scope and in focus, there is a great deal of methodological detail in this book that is useful to evaluators interested in determining the efficiency and effectiveness of regulatory programs. Naturally matters of efficiency are treated in greater detail, and the questions posed and insights offered about all phases of the operation of a program are invaluable. The authors devote a chapter to the review of program results in auditing government agencies. It includes some observations about how much more difficult it is to measure effectiveness than efficiency. Throughout the book useful and detailed advice is given on evaluation methods, including document review, cost determination and interview techniques. While these reflect an accounting approach, they are nevertheless worthy of consideration by non-accountant evaluators. They would be useful in evaluations of the efficiency of AECB programs.

Fowler, R.J. 1982. Environmental Impact Assessment - Planning and Pollution Measures in Australia. Dept. of Home Affairs and Environment. Australian Government Publ. ervice, Canberra.

C4.1.3

This paper examines the problem of "overlaying" regulations arising when two levels of government impose regulatory programs on the same industry - in this case, federal and state jurisdiction in environmental planning and pollution control areas. It asks questions about the seat of ultimate authority, the necessity for federal programs when state programs already exist, the need to efficiently integrate new programs with existing ones to avoid duplication, and the creation of an administrative quagmire for the regulatee. It also examines the options regarding choice of regulatory instrument - should new controls be legislated ? The paper is an example of an evaluation of an existing program from first principles. It has relevance to evaluation of AECB's relationship to other regulatory bodies e.g. those concerned with health and safety, environmental safeguards etc.; to areas in which it has been necessary to isolate the nuclear industry from the mainstream industries because of the nature of the work environment; and to studies which describe the setting of AECB-regulated industries in the larger context of industry in Canada.

Fox, D. 1979. Public Participation in the Administrative Process. Administrative Law Series Study Paper. Law Reform Commission of Canada.

B4.2, C4.1.3, D1, D2.1

This is a study addressing and evaluating procedures and practices which increase public involvement in the administrative process. Information was obtained by reading hearings' transcripts and internal reports, attending selected hearings, and conducting interviews with representatives of administrative tribunals and other government bodies, public interest groups and advocates.

There are two case studies : the CRTC chosen because it has been the most innovative and active independent regulatory agency in the field of public participation; and the AECB as it represents agencies which may, but had not chosen to, encourage public participation. In each case there is a review of the statutes affecting the agency, noting where it has been directly influenced by legislation on public participation policy; and an examination of the regulatory activities illustrating procedures which either encourage or detract from public participation and the representation of public interests.

The second half of the study discusses different representation techniques. Representation by correspondence, by public interest law firms, by commissions of inquiry and by peoples' commissions are discussed with the aid of charts comparing the effectiveness of some of the different types of representation. A chapter on surveys describes different types, advantages, and foreign experience - including a survey in New Zealand designed to gain input into that country's energy strategy, and Norway's use of polls to determine the public's views on atomic energy. The Department of Public Advocate in New Jersey is recommended highly by the author. It can instigate public action as well as attempt to rectify wrongs. Independent counsel and public interest groups are also mentioned. The final chapter outlines and evaluates methods for funding public participation.

The comparison between the CRTC and the AECB would be useful to staff evaluating the AECB public participation program.

Franson, M.A.H., R.T. Franson and A.R. Lucas. 1982. A Comparative Study of Canadian Standards, Standard Setting Processes and Enforcement. ECA83-SP1, Edmonton. Environmental Council of Alberta.

B3, D1, D2.6.1

This report interprets environmental standards rather narrowly. What it deals with are standards for chemical pollutants released into air and water. The authors prescribe what they consider to be an ideal standard-setting process. They compare environmental standard-setting by federal and provincial governments in Canada with the ideal, and with each other, and use these comparisons to evaluate Alberta's practices. They also review the enforcement of pollution control standards in Canada and note the lack of statistical data on compliance and enforcement. Methods of securing compliance are therefore reviewed but not evaluated. Information used in the report was gathered from published literature, regulatory documents, records of legal cases and by means of interviews. These methods are not novel, but the example of the comparative approach to evaluation that the report provides is unusual and relevant to the evaluation of many elements of regulatory programs such as AECB's.

Freeman III, A.M., R.H. Haveman and A.V. Kneese. 1973. The Economics of Environmental Policy. J. Wiley and Sons.

C4.1.3, D2.5

The book deals with the protection of environmental quality as an economic problem whose resolution depends on major changes in economic, political, and legal institutions. The authors emphasize the "interconnectedness" between the economy and the environment and view environmental degradation as a failure of the market system to allocate environmental resources efficiently between their alternative uses. This misallocation is particularly evident in regard to common property resources and the authors analyse the problem of designing institutions to effectively bring environmental resources back into the economic system and fairly allocate uses and costs.

The volume provides an introductory economic perspective on environmental protection, the estimation of costs and benefits, and the costs of compliance and enforcement. It is a useful background reference to the role of environmental protection in the economic system. The issues addressed are likely to arise in evaluations of AECB's programs when program impacts are assessed.

Freeman, H.E. and M.A. Solomon. 1981. Evaluation Studies Review Annual. Vol. 6. Sage Publications.

A6, C3.1, E2

This compendium is entitled "Evaluation in the Uncertain '80's" and contains a selection of articles covering many aspects of the theory and application of evaluation in the fields of education, social sciences, health, and environment. The theoretical papers are of most interest to the design of an AECB evaluation program. Cronbach et al. set out their own "95 theses" on the basic principles of evaluation and some directions for its reform. This reference is an excellent starting point and raises questions which an evaluator should address at the conceptual stage.

Wholey discusses the use of evaluation to improve the performance of government programs, dealing largely with the problems of careful definition of goals and objectives and ways to ensure cooperation and acceptance from all levels within the agency under scrutiny. He also discusses evaluability assessment as a preliminary step in the evaluation process.

The other articles discuss more specific socially-oriented applications of evaluation and are largely case study reports of only very general interest.

Fromm, G. 1981. Studies in Public Regulation. MIT Press.

C4.2.1, D2.5

The book contains eight survey papers (with reviews and comments) presented at a conference on public regulation. The papers deal with the theoretical basis of regulation and its role as an economic and social tool for government. The analysis in each article is basically microeconomic. The book would be a useful background reference for economically based studies of AECB regulation, and analyses of the economic effects of regulation on an industry. It would help in defining evaluation questions and selecting analytical methods in the microeconomic area.

Fry, R.M. and I.W. Morison. 1982. Regulation of the Management of Waste from Uranium Mining and Milling in Australia. IAEA, Vienna.

C4.1.1, C4.2.2.1

This paper describes the regulation of the management of waste from uranium mining and milling in Australia. It outlines Commonwealth/State arrangements and current waste management regimes applying to uranium mining operations in the various States, with particular reference to the effectiveness of the two-level system in meeting operational and public safety requirements. Under the Australian federal system, the States are primarily responsible for mining activities, public health and environmental protection. National controls are being achieved mainly through the development of national codes of practice. In the Northern Territory the Commonwealth Government maintains a role complementary to that of State authorities.

This is of interest to AECB because a comparison with Australia's regulation of the uranium mining and milling industry is one way of evaluating its own regulation. It is especially interesting as two levels of government are involved.

Ghorpade, J. (Ed.) 1971. Assessment of Organizational Effectiveness - Issues, Analysis, and Readings. Goodyear Publ. Co. Inc.

D2.3

The book aims to clarify and resolve the basic issues in the study of organizational effectiveness. It looks at the broad theoretical and conceptual issues involved in approaching a study of organizational effectiveness; deals with criteria of organizational effectiveness; discusses some recent studies; and deals with some methodological considerations. For each topic, the key issues involved in assessment are isolated and discussed and a selected set of readings illustrating the discussions are given. The book would be useful to AECB evaluators in helping to define the issues involved, to gain a broad idea of what such an evaluation aims to achieve and of the different approaches to its conduct. It does not, however, tell an evaluator how to assess organizational effectiveness in minute detail.

Gibson, R.B. 1978. The Strathcona Sound Mining Project : A Case Study of Decision Making. Science Council of Canada Background Study #42.

B4.2, C4.1.1, D1

This is an evaluation of a regulatory approval process carried out by means of a single case study. It includes a detailed review of how permit conditions are defined. The perspective is social and political, with emphasis on public participation. The author proceeds by examining written documents and interviewing participants. He identifies a variety of social, environmental and economic issues that arose in the context of the particular development under study, and discusses how they were dealt with in the regulatory process. The paper is useful in defining issues for evaluation of licensing or approval processes and for the design of case studies. Both are of relevance to AECB. It also illustrates the influence on an evaluation of the values of the evaluator.

Gilmore, W.R. (Ed.) 1977. Radioactive Waste Disposal - Low and High Level. Noyes Data Corporation. Pollution Technology Review No. 38.

D2.6.3

This is a technical reference describing current and proposed methods of radioactive waste treatment and disposal. It has an extensive bibliography, although now somewhat dated, and would be useful in defining evaluation issues for AECB's regulation of those activities.

Globerman, S. and M.P. Rothman. 1983. A Framework for Evaluating Canada's Trademarks Act. Consumer and Corporate Affairs Canada.

C4.2.1, D2.1, D2.6.4

This study attempts a comprehensive socio-economic analysis of the Trade Mark system in Canada. It is a useful example of the economic approach to determining social effects. Although not intended to develop specific evaluation questions, it does provide a context in which they can be defined. Perhaps its greatest value to AECB is as an example of the kind of socio-economic impact analysis or "effects evaluation" that might now be required when regulations are changed.

Goldhaber, G.M. 1979. Organizational Communication. 2nd Edition. Wm. C. Brown Co. Publishers.

C4.1.2, D2.3

The volume is an often-quoted textbook on commmunication within large complex organizations. The book begins from first principles to define terms and to describe the communication environment, the players, theories of organization, and communication methods. Of interest to an AECB evaluation is a discussion of assessment of the effectiveness of communication as measured by various parameters related to employee satisfaction. The book also looks at several models and scales of communication from employer-employee relationships, small group communications, to large public corporate communications.

Two chapters deal with diagnosis and assessment of communication problems, including the hiring of consultants and the communications audit itself. These sections are of particular interest to AECB as they represent one distinct method of evaluation of internal functions and relationships. The book provides a detailed plan for a communications audit with examples and case studies.

Gordon, M.E. 1981. Agricultural Land and Land Use Planning in Alberta : A Review of Planning Legislation and Practices. Environmental Council of Alberta.

C4.1.1, D2.2

This report is one of several by the Economic Council of Alberta written in response to concerns about loss and fragmentation of agricultural land, impacts on the capability of the land to produce agricultural products and impacts of other activities that influence the effectiveness and efficiency of agricultural activities.

The report documents the existing land-use planning legislation and practices (at all levels of government) which influence the agricultural land base in Alberta. It gives a brief discussion of the constitutional jurisdiction of the various levels of government regarding land-use, followed by detailed descriptions of provincial, regional, municipal and federal land-use planning responsibilities. An overview of these planning activities is provided, and a number of issues raised.

This type of evaluation is of interest to AECB as it describes and analyses the legislation and practices of a field regulated by several different levels of government. It shows where the responsibilities of the different governments lie, where there is overlapping legislation and where there are omissions.

Gordon, M.E. 1980. Administration and Regulation of Noise in Alberta. Environmental Council of Alberta.

C4.1.1, D1, D2.2, D2.6.1

This bulletin describes the involvement of all levels of government in the regulation and administration of noise in Alberta. There is a brief discussion of the relative merits of attempting to solve noise problems through common law and statute law, a detailed survey of the involvement of three levels of government (municipal, provincial and federal), and an international perspective against which to compare Albertan and Canadian regulations. A final chapter discusses a variety of views regarding current administration and regulation of noise in Alberta. This is of interest because AECB has to work with different levels of government in many of its programs and may wish to evaluate its methods of doing so.

Gorecki, P.K. 1981. Regulating the Price of Prescription Drugs in Canada : Compulsory Licensing, Product Selection and Government Reimbursement Programs. Economic Council of Canada Report # 8.

B4.2, C4.2.1, D2.2, D2.4, D2.5

This study attempts to evaluate the impact of amendments to the Patent Act, and other reform measures, on the price of drugs and on the performance of the drug industry. An overview of the legal, economic and institutional framework is given first. The success of compulsory licence provisions is assessed in terms of numbers of licenses issued and the time taken to process the applications. The report discusses variables which affect the numbers and licensing patterns and performs regression analyses on them. Licensees and patentees are discussed and analysed to find out whether price competition has been stimulated. The impact of compulsory licensing on the prescription drug bill was measured by estimating and comparing the total drug bill before compulsory patent licensing, the bill using the lowest price for each drug as the standard price, and the actual drug bill. The impact on the drug industry is also analysed, using a series of indicators of industry performance.

This is of interest to AECB as it discusses the impact of regulation on the regulated industry and analyses the effectiveness of the regulation in achieving its objectives. Some of the methods used in assessing the efficiency of the licensing process may be applicable to AECB activities.

Gorinson, S.M. 1979. The Nuclear Regulatory Commission. Staff Report to the President's Commission on the Accident at Three Mile Island. Washington D.C.

B4.2, C4.1.1, C4.2.2.2, D1, D2.2, D2.6.3, D2.6.4

This is one of the staff reports to the Kemeny Commission investigating the accident at Three Mile Island. This one examines the performance of those offices of the Nuclear Regulatory Commission involved in both the licensing and enforcement areas. A staff of three attorneys and four legal assistants heard 60 depositions, received 100,000 papers and NRC related documents, and conducted predisposition interviews as well as numerous other interviews. It gives an historical account of the NRC and its antecedent regulatory body (AEC). The structure of the NRC and the role of the commissioners, plant licensing, inspection and enforcement, the role of the office of nuclear research, operator licensing and training, and NRC emergency response procedures are all examined.

It is a straightforward factual account which clearly pinpoints the problems at NRC, and is of value to AECB as a basis of comparison for evaluation of its own licensing and enforcement procedures and policies.

Grange, Mr. Justice S.G.M. 1980. Report of the Mississauga Railway Accident Inquiry. Transport Canada.

C4.2.2.2, D2.2, D2.6.4

The report describes the findings of the Royal Commission established to investigate the derailment of a train carrying dangerous chemicals at Mississauga on November 10, 1979, resulting in the evacuation of 250,000 people.

The findings of the Commission are particular to the Mississauga accident and the methodology is standard to Canadian public inquiries. Evaluation of the role and actions of regulatory agencies in these types of situations is limited to the federal responsibility. Recommendations are made in particular on the role of the Canadian Transportation Commission in implemention and enforcement of the Transportation of Hazardous Goods Act.

Grinnell, R.M. Jr. (Ed.) 1982. Social Work Research and Evaluation. F.E. Peacock Publishers, Hasca, Illinois.

A6, D1, D2.1, E2

This is a voluminous text on social research and evaluation intended to help students in graduate courses. It discusses formulating research problems and finding appropriate research methods. It shows, with examples, how to analyse many kinds of program evaluation data. A final section discusses evaluation and the dissemination and distribution of research knowledge. Problems of presenting evaluation results in a form that can easily be integrated into program management and planning are discussed. These are relevant to the final phase of AECB evaluations.

Gummer, W.K. 1982. Regulation of the Canadian Nuclear Industry. Atomic Energy Control Board, Ottawa.

B4.2, D2.2

This paper reviews the nuclear regulatory process in Canada in the context of the present political and economic environment (both domestically and internationally) and the basis for current AECB operations - with reference to the Atomic Energy Control Act and the proposed Nuclear Control and Administration Act. Specific areas of the regulatory process are discussed in detail to show where ambiguity and uncertainty may arise, as in the field of uranium mining, occupational health and safety, environmental protection, waste management, heavy water plants and transportation. The paper identifies generic issues which should be addressed when evaluating legislation and regulatory programs. It is an important source for AECB evaluators.

Hahn, R.W. 1982. On the Applicability of Market Solutions to Environmental Problems. J. of Environmental Management, Abstracts in English. Vol. 14, No. 2, P. 161.

C4.1.3, D2.4

The paper focusses on the interplay between science and social science in choosing policy tools for dealing with environmental problems. In particular it seeks to identify how increasingly sophisticated modelling of pollution problems might be used in making a judicious selection between policy tools. The author argues that in the case where the relationship between emissions and environmental quality is known, then on cost-effectiveness grounds emission taxes or licenses would seem preferable. When the causes of the pollution problem are less well understood then the choice between policy tools is less clear-cut. The paper emphasizes that it is cost-effective for the regulator to be consistent because if rules guiding tax or license schemes are changed unpredictably it will not encourage industry to consider long-term investment in pollution control. The paper offers a few ideas on cost-effectiveness which could be applied to areas of pollution control and waste management in AECB's program. The analysis of different approaches to regulation is relevant to the evaluation of program alternatives.

Hall, P. 1980. Great Planning Disasters. Weidenfeld and Nicolson, London.

C4.1.2, D1, E1, E2

Peter Hall presents a series of case studies of major industrial planning failures. He then proceeds to analyse the reasons for the failures, and it is this analysis that is not only persuasive but of great potential value to those responsible for identifying evaluation issues. A good deal of Hall's analysis is of regulatory bodies of one sort or another and the rest concerns large public and private corporations whose mode of operation has much in common with government. As well as offering insights into obstacles to the effective function of regulatory and planning authorities, Hall provides an extensive reference list. His book would be useful to AECB staff commissioning evaluations or to an evaluator of AECB programs in the early stages of his evaluation.

Hall, R.H. 1982. Organizations : Structure and Process. 3rd Edition. Prentice-Hall Inc.

C4.1.2, D2.3

The book is an attempt to reflect the current understanding of organizations. The subject is introduced by an analysis of the role of organizations in society and a definition of what organizations are. This is followed by a section on organizational structure analysing and integrating studies on various aspects of the subject. It attempts to demonstrate the importance of structure for organizational participants, the organization itself and for those in contact with it. Structure is defined and then discussed from the standpoint of its complexity, varying degrees of formalization in rules and procedures, and distribution of power. The section on organizational processes discusses power, conflict, leadership, decision-making, communications and change. These processes contribute to the output of organizations in terms of their effectiveness, and are therefore of interest to evaluators.

The section on organizational environments deals with the nature and impact of organizational environments. It first of all discusses the environment in a general way, presenting research findings and conclusions on the impact of environments of organizations. It then focusses on interorganizational relationships. This would be of interest to AECB which has to cooperate with other agencies, departments and governments in many areas of its regulation. The section on organizational effectiveness and organizational theory deals with the two topics which have been central to the entire book. Conceptual and methodological contradictions in the analysis of effectiveness are reviewed and a contradiction model is developed. This could be applied to the effectiveness of AECB organization and to the development of program alternatives.

Hamel, P.E. 1981. Le Role et la Structure de la Commission de Controle de l'Energie Atomique. AECB.

B4.2

The paper describes the functional organization of staff that assist the Board for the administration, the assessment and the issuance of licenses, compliance and inspection, as well as for the management of the regulatory research program. It is useful to AECB evaluators for the first descriptive step in evaluation.

Hanser, C.J. 1965. Guide to Decision : The Royal Commission. The Bedminster Press.

C4.1.2, D2.2

Hanser deals with Royal Commissions in the 20th. Century, discussing such things as their manner of appointment, their composition and procedures, and points of principle and problems encountered in their use. It lists Royal Commissions and the subjects they have addressed, but investigative methodologies used by a particular commission are not detailed. It has chapters on Royal Commissions on the police, divorce and the coal industry, and the equivalent of Royal Commissions in the United States with a discussion of the limitations of their present structure and their creation. The book gives an understanding of how Royal Commissions work and what their purposes are. The reference would be useful to AECB if the Board wished to establish a Commission of Inquiry into some part of its programs or into a particular incident.

Harrald, J.R., K.R. Karwan, J.V. Leotta and W.A. Wallace. 1979. Assessing the effectiveness of a marine environmental protection program. In A.C. Hyde and J.M. Shafritz (Ed's.) : Program Evaluation in the Public Sector pp. 346-56. Praeger, New York.

C4.2.2.2, D2.4, D2.7

The evaluation described in the paper is of the effectiveness of the U.S. Coast Guard's marine pollution abatement program. It begins with a discussion of the technical difficulties faced by the evaluators. Particular reference is made to : (i) the lack of a baseline for comparison with the incidence of pollution before the program was introduced; (ii) the difficulty of assigning quantitative impact values to, and determining the economic impact of, pollution in general and of individual pollution incidents; and (iii) the difficulty of separating costs of the pollution abatement program from those of related programs sharing some of the same facilities and resources. Program effectiveness was approached by breaking down program objectives into prevention, surveillance/detection (of spills), response and enforcement. The evaluators attempted to measure separately the resources utilised for each activity and the outcome(s) of each activity. Outcomes were classified into : (i) activities completed; (ii) efficiency measures (i.e. resources required for activity); (iii) effectiveness measures, relating incidence of pollution events to program activities; and (iv) cost-effectiveness measures, relating effectiveness measures to their cost of achievement. The methodology and the difficulties encountered are of direct relevance to evaluation of the effectiveness of AECB regulation.

Hart, B.T. 1982. Australian Water Quality Criteria for Heavy Metals. Australian Water Resources Council, Canberra.

D2.6.1

An excellent example of the scientific approach to setting regulatory standards, this report includes an extremely detailed review of the subject, drawing on published research and regulatory reports, processes and practices throughout the world. It gives a clear account of how standards are defined and of potential weaknesses in the methods used. If AECB standards for emissions or irradiation were to be reviewed this paper would provide a good methodological model. If AECB's methods of defining standards were to be evaluated the paper would help define evaluation questions.

Hartle, D.G. 1978. The Expenditure Budget Process in the Government of Canada. Canadian Tax Papers No. 60. Canadian Tax Foundation.

A1.1, A3, C4.1.2, C4.2.1, D2.4, E1

The paper responds to public concern over increasing government expenditures by describing the expenditure budget decision-making process in Canada. The book was written for the layman and as a first step in understanding how the system works prior to much-needed reforms. As such, it is not evaluative but rather pre-evaluative or descriptive. Hartle believes that the effectiveness of government spending should only be assessed on a program by program basis.

He describes the decision-making structure and processes, the roles of the various arms of government, and the political and external influences on the system. Chapter 4 discusses techniques for improving effectiveness, reforms which have already been instituted, and the importance of identifying overall goals to be achieved by means of expenditures. This chapter also contains a discussion of the evaluation of government programs based on goal-achievement, and its influence on decision-making and policy. He looks at benefit-cost analysis and "operational performance measurement systems" as two evaluation tools, the latter applicable to easily quantified parameters, and the former to more obscure concepts such as the value to society of environmental protection laws. The advantages and limitations of these approaches are also discussed. The book concludes with a section on suggestions for policy and process reforms.

Hartle (1978) is an often-quoted and useful reference on the Canadian government system. It provides a general view of some aspects of evaluation in the government and a detailed examination of the strengths and weaknesses of the parliamentary budgetary review process as an evaluation tool in itself.

Hatry, H., L. Blair, D. Fisk and W. Kimmel. 1976. Program Analysis for State and Local Governments. The Urban Institute.

A6, C3.1, D2.4

The report is intended to help state and local governments improve their program analysis capabilities. It describes how and when it is appropriate to use program analysis, which is defined as the systematic appraisal of the likely costs and major effects of feasible alternatives. It addresses what is required for program analysis including staffing and institutional settings. Five basic elements for launching program analysis are discussed in detail, with illustrative examples, charts and tables. These are : defining the problem; identifying objectives; setting evaluation criteria; specifying client groups served or affected by a program; and identifying alternative programs to be analysed. Methods of estimating program costs and effectiveness are discussed and examples are given from actual program analyses.

The book deals with social service type programs, but the approach and methodology described here could be applied to most programs. It identifies many issues and outlines many methods that can be used in program evaluation, including evaluation of AECB programs.

Hatry, H.P., R.E. Winnie and D.M. Fisk. 1973. Practical Program Evaluation for State and Local Government Officials. Washington D.C. The Urban Institute.

A6, C4.2.1, D1, D2.4, E2

This report is intended to help state, county and city officials carry out the evaluation function. The scope of current practices of effectiveness and impact evaluation of service type programs is discussed, especially in the area of finding out if such programs are accomplishing what was intended (using such methods as annual effectiveness status monitoring and key indicators monitoring to find trends). It gives basic steps in conducting program evaluation, guidance in setting objectives to be measured, a description of clientele groups to be considered and evaluation designs and techniques. There is a discussion on how to estimate what changes are attributable to program, rather than non-program factors. The methods proposed are comparative and their advantages and disadvantages are clearly stated.

A useful, but simple, example is given comparing Connecticut traffic fatalities with those of other States after Connecticut imposed new regulations. It emphasizes evaluation approaches that are practical and within the economic and technical capabilities of governments making studies. A case study is given to illustrate the ideas in the book. Finally, "institutional" issues such as staffing costs, the role of the executive officer and staff, and presentation and treatment of evaluation results are discussed.

This would be a useful report for AECB staff planning an evaluation. It is well written and the methods recommended are not excessively costly. It is oriented towards service type programs, (the case study is of garbage collection), but the ideas and methods described could be applied to determining the effectiveness and impact of regulatory programs.

Hicks, M. (Ed.) 1981. Evaluating Evaluation in Today's Government. National Seminar, March 1981. Canadian Public Administation 24, No.3, Fall 1981. p 350-431.

A2, A5, A6, E1, E2

This volume includes a series of papers given at a seminar, and discussions arising from the papers. The papers were presented by federal and provincial civil servants, some academics, a former cabinet minister and a retired attorney general, thus looking at evaluation from several different perspectives. Ideas and theories of evaluation, what is being done in the field, and obstacles to successful evaluation are discussed. The book would be useful to senior staff responsible for commissioning evaluations. It offers a good understanding of the political problems involved in evaluation and of its practical limitations.

A paper by Rogers defines program evaluation and goes on to determine, in the light of present circumstances, the adequacy of its objectives, its design and its results, intended and otherwise. He emphasizes that the Deputy Minister is the client, a factor that is very influential in determining the scope, context and even the outcome of Treasury Board style evaluations.

Bonin and Moran state that the difficulty in program evaluation is putting a price on the benefit of a government program, but evaluation can be worthwhile if the program objectives are clearly formulated. There are two constraints on effective evaluation : (i) technical factors such as too many variables or lack of analytical neutrality; and (ii) the inability for political reasons to respond with the most routine solution.

Dobell and Zussman think that evaluation has not worked so far because the private sector model cannot be applied to the public sector, because of the priorities of parliamentary government. The type of evaluations wanted now will only work within departments, so there is a need to get the public to scrutinise these evaluations to give an independent perspective.

Other things of note mentioned were that evaluation before a program is launched might be more valuable than evaluation later; that program objectives must be clearly identified (one province did after-the-fact identification of objectives); and that senior public servants fear evaluation as it could hold them to account for their actions or could be used to withhold funds.

Hoos, I.R. 1983. Systems Analysis in Public Policy - A Critique. U. of California Press.

B4.1, C2, C3.2, C4.2.1, D2.5, D2.6.2

This is an inquiry into systems analysis, its origins and applications to the analysis of public programs, its uses and abuses, its present impact and future implications. The technique is examined in theory and in practice. The assumptions implicit in the approach as it developed over time, and their validity as a basis for social planning are analysed. They are examined in the context of the specific areas where systems analyses are being applied - education, crime, health and welfare, land-use, transportation and pollution. The experience with information systems analysis as components of these areas and as entities in themselves are examined in detail. The process, procedures and products of systems analysis are analysed for social, cultural, political and economic factors that influence the adoption of this problem solving techique, especially cost-benefit ratios and planning-programming-budgeting. The section on techniques at work in waste management and health would be useful to AECB as the author carefully points out the mistakes that have been made in applying the technique. There is a good discussion of risk analysis and assessment of nuclear risks in the chapter on the implications of systems modelling.

The theme of the book is to imprint on the reader the weaknesses of systems analysis. Systems analysis is intolerant and antagonistic to unquantifiable variables; it contains bias against human and social factors; its ethic is that of the market place; and it is driven by technical optimism - but this method of analysis is so entrenched that to criticize is considered irrational.

Hyde, A.C. and J.M. Shafritz (Eds.) 1979. Program Evaluation in the Public Sector. Praeger.

A1.1, A1.2, A3, A5, A6, C2, D1, E1, E2

This is a compendium of contributed papers covering most aspects of evaluation in an American public service context. A few of the papers have been published elsewhere. Most of them have something to offer evaluators of AECB programs.

The introduction provides a useful overview of the state-of-the-art in 1979. It includes an explanation of the surge in interest in evaluation at the time, an analysis of what evaluation can and cannot achieve and a discussion of who is the most appropriate commissioner of evaluations. O.F. Poland's paper deals with the role of evaluation in the panoply of public administrative methods and with some of the difficulties of incorporating the results of evaluation into public service management. W.F. Balk distinguishes between productivity analysis and evaluation and clarifies their roles in improving government management. Carol Weiss deals with the political context of evaluation and shows how influential are : (i) the political origins of the program under review; (ii) the internal politics of the agency or agencies involved; and (iii) the political perspective of the commissioner of the evaluation and of the evaluator him or herself. S.J. Mushkin provides advice to evaluators about the need to present their findings in a clear and unambiguous manner so that they cannot easily be misrepresented and D.H. Rosenbloom considers the question of accountability - to whom ?

The book also includes several chapters each on evaluation in the various levels of government in the United States and on evaluation by or for legislative bodies. It concludes with four case studies, one of which (Harrald et. al.) is abstracted elsewhere in this bibliography. The value of this book lies in its placing of evaluation in the overall context of government management, in its discussion of the difficulties of achieving objectivity in the conception, design and implementation of evaluation and in its treatment of the use and misuse of the results of evaluation.

I.D. Systems, Winnipeg. 1984. Evaluation Assessment of the Northern Affairs Environmental Protection Activities. Background Paper. Prepared for Evaluation Branch, Corporate Policy. DIAND.

B4.2, C3.2, C4.2.1, D1

Within the evaluation framework defined by the Treasury Board of Canada, this is probably the evaluation report most relevant and most useful to independent regulatory agencies such as AECB. In Treasury Board terms, it is an evaluation assessment, that is it deals with the planning and design of evaluation but does not actually carry it out.

The report begins by providing a detailed description of the Northern Affairs environmental protection program, including separate treatment of legislative mandate, objectives, program activities, program resources, organizational structure, linkages with other groups, program outputs and program impacts. "Logic diagrams", as recommended by Treasury Board are used to summarize the description. The authors also review six other program evaluation reports that deal with parts of the subject program or with related programs.

The authors identify evaluation issues by analysis of the program description, by examination of related evaluation studies, by review of program documents and by means of an elaborate interview program that covers a wide range of informants. The issues are refined into more specific evaluation questions and the difficulties of answering the questions are succinctly reviewed. The strengths and weaknesses of some of the methods available for answering the questions are also reviewed. The selection of methods for review is similar to that of the Program Evaluation branch of the Comptroller General's Office (Treasury Board, 1985, see this bibliography). Several options for evaluation of the subject program are outlined in the concluding part of the report. The authors recommend against the execution of most of these until departmental policies that influence program activities are clarified.

Ikeda, S. and D. von Winterfeldt. 1982. Standards Against Noise Pollution : The Case of Shinkansen Trains in Japan. Journal of Environmental Management 14, 3-16.

C3.2, D1, D2.6.1

This paper analyses the noise pollution problem of high speed trains in Japan using a decision analytic approach to model the problem and identify sources of conflict among the various actors involved in railway noise standard-setting. The approach begins by identifying the actors or organizations involved. These include regulators, developers, impactees, experts and exogenous actors such as the courts and international institutions; a chart is given to show the configuration of the actors. The focus of the paper is on the regulator, the developer and the impactee. Organizational interlinkages are next defined, for example by monitoring, sanctions or compensation procedures. Then a set of objectives and a set of alternatives are defined for each of the actors. This is the "structuring phase" of the approach. In the modelling phase, multi-attribute evaluation models are developed so that each actor can evaluate respective alternatives in light of his or her objectives. The evaluations of the different actors are integrated in an overall evaluation model specifying intergroup trade-offs. An illustrative diagram is given. Data was collected from in-depth interviews, and numerical data quoted in the paper were obtained from the literature.

The study found many weaknesses in the standard-setting decision processes, and some good features in the organizational framework of the regulatory body, which would be of interest to AECB. This type of study has also been applied to an oil pollution problem and could easily be applied to analysing other regulatory decisions.

Information Spectrum Inc. (Arlington, Virginia). 1983. Risk Assessment Techniques. A Handbook for Program Management Personnel. Defense Systems Management College, Fort Belvoir, Virginia.

D2.3

This is a handbook for program managers giving a practical guide on the use of formal quantitative risk assessment, to assist with internal decision-making and effective program management. It is to assist the manager in balancing the risks of program failure through insufficient funding against the risk of program cancellation because funding requests are considered unaffordable. By-products of risk analysis are improved program definition and enhanced problem solving insight. Specific decision categories to which risk assessment can be applied are program control, major planning decisions, acquisition strategy selection, technical alternative selection, contract structuring and source selection. The book describes what risk assessment is, the benefits of doing a risk assessment, an overview of methods, technique selection and implementation. Methods described are network modelling decision analysis, method-of-moments, cost breakdowns, graphic method, estimating relationship method and the risk factor method. As well as a description of each, the authors give the input needed, the expected results, resource requirements and examples of where the method has been used. Technique descriptions are given in detail in an appendix and readers are referred to appropriate texts for further information. The content of this book would be useful in defining questions for evaluating the efficiency of many parts of AECB's program.

Institute for Energy Analysis. 1979. Economic and Environmental Impacts of a U.S. Nuclear Moratorium, 1985-2000. Oak Ridge Associated Universities.

C4.2.1, D2.5

This includes an assessment of the costs of alternative energy developments including a comparative assessment of associated health and environmental impact costs. While this is an American example, the economic modelling methods used are applicable to the Canadian situation. The report is useful in considering the fundamental issues of nuclear regulation and in the evaluation of its economic effects.

International Atomic Energy Agency. 1974. Environmental Surveillance Around Nuclear Installations. Volumes I and II. Proceedings of a Symposium, Warsaw, Nov. 5-9, 1973.

C4.2.2.2, D2.7

These volumes contain the proceedings of a symposium arranged by the International Atomic Energy Agency to assist Member States in controlling and minimizing the environmental effects of nuclear programs. Sixty one papers were presented covering : in Volume I, the objectives of environmental surveillance, pre-operational investigations, environmental monitoring procedures in normal and emergency situations and interpretation of results; and in Volume II, research and supportive studies and examples of environmental surveillance programs conducted at specific installations. Three short papers, by invited speakers, reviewed the problems arising in the establishment of standards and derived working limits, and the operation of adequate environmental surveillance systems for both radioactive and non-radioactive contaminants that might be released to the environment by the nuclear industry. There are many papers in these volumes which could be valuable to AECB when evaluating its own technical regulatory programs.

International Nuclear Energy Agency. 1983. Nuclear Legislation, Analytical Study : Regulatory and Institutional Framework for Nuclear Activities. NEA.

B3, B4.2, D2.2

This study reviews national legislation governing nuclear activities in OECD member countries and describes for each country the institutional framework within which it is applied. It is a clear descriptive study which makes it easy to compare the nuclear regulation of Canada with that of other countries and makes the regulatory process more understandable. Such comparisons are useful to evaluations analysing AECB's legislative mandate.

Member countries of OECD are Austria, Belgium, Canada, Denmark, France, the Federal Republic of Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg and the Netherlands. For each country the general regulatory regime is described first, and then particulars of the legislation covering different nuclear activities is given - with Acts and regulations cited. The areas of nuclear regulation covered are : the mining regime; radioactive substances, nuclear fuels and equipment; fissionable materials, ores, radioactive materials and equipment; protection of workers and public against ionizing radiation; nuclear installations; radioactive waste management; nuclear third party liability; nuclear security; tansport; and patents. The institutional framework for this legislation is then described again with Acts and regulations cited, and with the responsibilities of the various regulatory bodies set out. These bodies are Regulatory and Supervisory Authorities, Federal Authorities, Regional and Local Authorities, Specialized Committees and Boards, Advisory Bodies, and Public and Semi-Public Agencies.

Ishack, G. 1981. Methodology for the Inspection of Items Important to Safety - the Canadian Approach. AECB. Paper Presented to IAEA Seminar on Safety Review and Inspection of Nuclear Power Plants, Vienna.

B4.2, D2.7

The paper describes the AECB's inspection methods for nuclear power plants during the construction, commissioning and operating phases of the plants. The role of inspectors and how they work is discussed. The paper should be read by anyone evaluating the AECB nuclear power inspection process.

Jackson, P.M. 1982. The Political Economy of Bureaucracy. Philip Allan Publ.

A3, C3.1, C4.1.2, D1, D2.3, D2.4, E1, E2

This book should be read by every public servant. It provides a lucid analysis of the organizational structure, methods of decision-making and budgetary procedures in bureaucracies, and of the behavioural patterns of public servants. Armed with an up-to-date review of these subjects the reader is treated to a detailed analysis of efficiency in bureaucracy and obstacles to its assessment. The problem of accountability and control of bureaucracies is then addressed. Finally the limits imposed on the achievement of efficiency, accountability and effectiveness by the properties of bureaucratic organizations are defined. Recent British, American and Australian research on the subjects is thoroughly reviewed.

Evaluators will find the book useful for many reasons. Most important is its value in defining what might be achievable by a public service organization. This provides an absolute standard of comparison for evaluators. It also offers insights into organizational behaviour that can be of great value in the definition of evaluation criteria for examination of organizational arrangements and procedures (e.g. regulatory processes) and in the conduct of interview programs and the assessment of interview data. It will also be useful where any kind of accountability is a focus of evaluation.

Janisch, H.N., A.J. Pirie and W. Charland. 1978. The Regulatory Process of the Canadian Transport Commission. Administrative Law Series. Prepared for the Law Reform Commission of Canada.

B4.2, C4.1.1, D1

This Law Reform Commission report is one of a series on administrative tribunals and follows the same general descriptive methodology. The report outlines the legislative mandate of the CTC, its legal and political context, and the structure and powers of the Commission. A quite detailed description is given of the procedures followed by the CTC, its review process, appeal process, and the relationship of the Commission to the courts, Parliament, and the Ministry of Transport. The paper concludes with general observations on areas of weakness, such as the tendency of the CTC to deal with its broad mandate in a piecemeal case-by-case fashion, avoiding larger concerns and policy decisions, and questions of the appropriateness of the relationship between the CTC and the Ministry of Transport.

It is another example of the application of the descriptive evaluation methodology to a regulatory agency. It is of interest to AECB because of the parallels that are offered by another Canadian independent regulatory agency.

Jennekens, J. 1981. Canadian Involvement in International Nuclear Cooperation. AECB.

B4.2, D2.7

The paper summarizes the actions taken by Canada to encourage the peaceful uses of nuclear energy and to avoid the spread of nuclear weapons. Cooperation agreements with several countries are described and their success discussed. It is noted that only partial success has been achieved. The paper describes the program in place, and also identifies areas where there could be improvements - thus it would be useful in evaluating AECB's program for regulating the peaceful uses of nuclear energy.

Jennekens, J. 1980. Nuclear Energy - Some Regulatory Aspects. Lecture to Nuclear Engineering Students, Queen's University, Kingston, Ontario. AECB.

B4.2, C3.1, C4.2.2.1, D2.6.2

This lecture to Queens University students gives the evaluator a good idea of the philosophy and the approach of the AECB to its responsibility in the regulation of nuclear power. It discusses different aspects of risk such as the difference between nuclear and other accident risks and the need to constantly keep the awareness of risks alive. Nuclear safety principles and criteria are discussed with emphasis on the possibility of human error, and seven examples of applications of the defence-in-depth concept are listed (each with human error taken into account). An account of Canadian nuclear safety philosophy and how it developed is given. Jennekens finishes by discussing the continuing inquiry into nuclear safety issues.

Johnston, C.C. 1980. The Canadian Radio-Television and Telecommunications Commission - A Study of Administrative Procedure in the CRTC. Law Reform Commission of Canada. Administrative Law Series Study Paper.

B4.2, C4.1.1, D1

This study, undertaken by the Law Reform Commission, is one in a series examining the functions of administrative tribunals in Canada. The study evaluates the scope of CRTC powers, its decision-making procedures, the extent of political control over its work, and its relation to the public through detailed description of its activities. It is a good example of LRC's analytical approach, but because of the vast difference in regulatory mandate the study has application to the AECB only as a general analytical model of a Canadian regulatory agency. Sections dealing with the hearing process and public participation are the most relevant.

Jordan, J.M. and S.L. Sutherland. 1979. Assessing the Results of Public Expenditure : Program Evaluation in the Canadian Federal Government. Can. Public Admin. 22(4): 581-609

A5, C2, C4.1.2, C4.2.1, E1, E2

The paper discusses the (then) new office of the Comptroller General, in its role as administrator of the Treasury Board's policy on program evaluation. It describes the office's approach to program evaluation, reviews program evaluation in three other countries, and discusses the principles and practical problems which limit the application of evaluation reseach. In the authors' opinion program evaluation in Canada is hindered by : the proponents' over-exuberance; the cynics' view that evaluation is of limited applicability and that potential savings are negligible; and the tendency to fuse policy-related and management-related assessment activity.

The authors conclude that evaluation conducted from the operational management point of view (which takes program goals for granted) results in sequences of small victories and economies. They stress that dramatic improvement in routine management should not be expected from the use of effectiveness evaluation as a "bottom line" policy tool for judging the worth of whole programs.

The paper is a useful reference in the general field of evaluation in the Canadian government setting and of particular interest to those facing wide-ranging decisions on the design of an evaluation program.

Joyce, M. 1981. The Development of AECB Regulatory Documents. AECB.

B4.2, C4.1.1

This paper describes the AECB's approach to the development and preparation of regulatory documents. As a background to the evolution of regulatory documents, the principle factors which have shaped AECB's regulatory approach and a number of current influences affecting the present and future development of these documents are identified. The process by which regulatory documents are prepared and published and points of contact between this process and the Canadian Standards Association program for nuclear standards is described. This paper contains a good description of the process and is the first step needed to evaluate this part of AECB's program.

Karam, R.A. and K.Z. Morgan (Eds.). 1976. Energy and the Environment. Cost-Benefit Analysis. Proceedings of Conf., June 23-27, 1975. Sponsored by the School of Nuclear Engineering, Georgia Inst. of Tech. Supplement to Energy, Pergamon Press.

C4.2.1, D2.4, D2.5, D2.6.2

The volume contains the proceedings of a conference held to establish mechanics for cost-benefit analysis which could serve as a foundation for decision-making. The mechanics should provide a framework for rational assessment of the impacts of energy production on society and the environment. The framework must seek to define the global scales by which costs and benefits are measured. The price that society pays for the benefits of power must be quantified.

The papers are organized into seven sections. These are : (1) "Energy Resources and Projections : An Assessment"; (2) "Nuclear Fission Reactors and the Environment"; (3) "Fossil Fuel and the Environment - Special Emphasis on Coal"; (4) "Fusion Power and the Environment"; (5) "Cost-Benefit Scales"; (6) "Experience of Utilities in Financing of Nuclear Power Plants"; and (7) "Ecosystem Tolerance Limits of Power Plant Effluents". Papers in sections 2, 5 and 7 seem to be most relevant to AECB program evaluators, especially those in section 5.

"Quantifying the costs and benefits of energy", by Lindell, discusses a number of methods and principles which have evolved over the last few years for cost-benefit assessment in the field of radiation protection. An attempt is made to see to what extent these can be applied to cost-benefit analysis of energy production.

"Overview of reactor safety study", by Levine, presents the results of the "Reactor Safety Study" (Wash-1400), which is reviewed elsewhere in the bibliography (U.S. Nuclear Regulatory Commission, 1975).

There is a paper by Spangler on "Probabalistic methods of assessing risk in cost-benefit analysis of nuclear power plants and alternative energy sources". Licensing of nuclear power plants requires analysis of environmental and societal impacts of alternative energy sources, sites, plant designs and the alternative of not constructing. Evaluating the flow of costs and benefits during construction and the life of the plant requires forecasts to be prepared, the uncertainty of which is in itself a source of risk to societal values. This paper discusses the nature of risk and uncertainty, and explores different forecasting methodologies. It examines their application to the future supply and demand of alternative sources of energy and to the diversity of impacts of alternative energy technologies on public interests at local, regional and national levels.

"Energy and Society", by Karam, discusses the need for energy and presents a method for quantifying energy needs. Energy sources and their potential for the near- and long-term are surveyed. Social costs associated with nuclear and coal fuelled power plants are discussed, and a single standard for the protection of man and the environment is proposed.

"Quantification and comparison of external costs of nuclear and fossil eletrical power systems", by Brewer, quantifies the impacts of producing electrical energy by fossil and nuclear systems and normalizes the results to the annual operation of one 1000 MWe nominal unit operating at 75% capacity factor. Pro-rated impacts of supporting fuel cycle activities are included and impacts are reduced to dollar costs where possible.

"A preliminary matrix model for quantifying and balancing the socio-economic impact of alternative cooling system technologies for nuclear power plants", by Cleary, Salomon, Pollnow and Spangler, describes matrix methods which offer a set of techniques to allow the analyst to compare the relative impacts of alternative technologies or actions. These have been difficult to assess as environmental and societal impacts of alternative technologies and actions are not readily quantifiable.

"Decision analysis of energy alternatives : a comprehensive framework for decision-making", by Barrager, Judd and North, describes an analytical procedure for extending the traditional economic criteria for decision-making to include environmental and other social risks. Specific public policy decisions are the focus of the analysis. Preliminary calculations of the economic and social costs of electric power generation from coal and nuclear fuels are given as an illustration of decision-making based on the analytical framework.

Many of the papers in this volume describe, or illustrate the use of, methods applicable to determining the impacts of AECB programs.

Kaufman, R.and S. Thomas. 1980. Evaluation Without Fear. New Viewpoints, A Division of Franklin Watts, New York.

A6, C3.1, D2.1

This general text offers advice about how to ask and answer basic questions on evaluation and how to identify values associated with questions, definitions of program goals and program participants. It discusses evaluation in terms of its scope and nature, context, goals, methods, implementation and interpretation of results. What is required, in terms of program design and support, to conduct a successful evaluation is also set out. The appendix includes instruments used in evaluation such as questionnaires and tests. It provides guidelines for choosing the right instruments such as determining validity, reliability, practicality, limits of feasible use and ethical considerations.

Keeling, D. 1972. Management in Government. Prepared for the Royal Institute of Public Adminstration, London. George Allen & Unwin Ltd.

A3, C3.1, C4.1.2, D2.3, E1

Keeling provides criteria for evaluating public service management decisions, such as commercial success, positive cost-benefit, electoral success, achievement of consensus through bargaining and national interest. He then applies these criteria to management improvement at different levels: the working level, the level of program planning, budgeting etc., and the level of large scale economic management. His recommendations are designed to improve the input/output relationship by reorganization and changes in work.

One chapter deals specifically with the assessment of performance in government management. It defines what should be assessed, inquiry and measurement, where and how quantitative data can be obtained and the need for new processes of inquiry. It outlines the different forms evaluation can take, the types of analysis that are carried out, and who should evaluate. Most of the examples are from Britain.

This book would be relevant to any government department or agency manager wishing to obtain a better understanding of management - the process, constraints and how to evaluate and improve it at all levels.

Kelly, M.L. 1982. Attitudes Toward the Environment : A Comparison of Six Surveys Spanning Six Years. Environmental Council of Alberta. ECA82-ST/2.

D2.1

This is a study comparing six surveys of public opinion on attitudes towards the environment, including attitudes towards regulation and the regulators. The Environmental Council of Alberta commissioned an Alberta wide survey and had questions included in an Edmonton survey. To obtain a wider information base the ECA compared these surveys with four others of various types. An Alberta Department of the Environment survey was selected to provide a comparison with general attitudes five years before. A Canada wide Environment Canada survey was also included because some of the variables were available on a provincial basis enabling comparison of opinions of Albertans with those of Canadians in general. An Ontario wide survey by the Ontario Ministry of Environment was used for general comparative purposes and because of its unique methods and the variety of topics it covered. A United States survey was selected for a cross-border comparison as environmental problems were similar and because it discussed survey results from previous years. It is emphasized that direct comparison between diverse public opinion surveys is not a scientifically sound endeavor, as it relies on inference for interpretation rather than predetermined statistical probabilities. It does however expand the breadth of information and depth of opinion and is a way of evaluating public participation.

The method used in this study would be useful to AECB in evaluating public participation and public perceptions of its regulatory programs.

Kelman, S. 1981. Regulating America, Regulating Sweden : a Comparative Study of Occupational Safety and Health Policy. Cambridge, Mass, MIT Press.

B3, D1, D2.2

This is a comparative study of two organizations both performing similar functions and both concerned with occupational safety and health administration, one in Sweden and one in the United States. It is also a study of the political culture that shapes the activities of the regulatory agencies. It combines an analysis of the two nations with two kinds of government activity in those nations - policy making with a focus on how conflict is managed, and implementation with the emphasis on methods and predispositions by which social control is exercised. In a section on rule-making case studies, noise, construction and toxic chemicals are discussed. Also covered are rule-making and public policy, rule-making and the social system, compliance and public policy and compliance and the social system. The conclusions and implications about the similarities and differences of the two systems are interesting and sometimes surprising, for example the business sector sometimes has more influence in "socialist" Sweden than "capitalist" United States. The relevance to evaluation of regulatory programs is evident.

Kernaghan, K. (Ed.) 1983. Canadian Public Administration. Discipline and Profession. Butterworth. Toronto.

A3, C3.1, C4.2.1, D2.4

This volume is a collection of papers on a wide range of topics related to public administration. The only paper of direct relevance to evaluation is by Schultz - "Regulation and Public Administration". He looks at two areas of current research regarding independent federal regulatory agencies - regulatory agency accountability and regulatory cost and benefits - both of which are important to evaluation.

Accountability is a central issue arising from the work of the Law Reform Commission, the Economic Council, and others and is discussed in the context of : (i) the nature of the regulatory mandate, whether statutory, through policy directives or other; (ii) the scope for policy-making on the part of the agency and the government; and (iii) the ultimate seat of accountability at the political level. The process of appeal to Cabinet from regulatory decisions is discussed, focussing on the importance of political factors in the ultimate outcome. The debate regarding the abolition of Cabinet appeals is also outlined.

The second part of the article examines briefly the important issue of the costs and benefits of regulation, and the use of cost-benefit analysis (CBA) as an evaluative tool. Schultz addresses two important issues - the neutrality of CBA and the question of whether or not it is possible to develop tools for establishing and measuring the costs and benefits of regulation.

Schultz concludes by outlining areas for future research - these include an analysis of the origins of independent agencies in the Canadian system, the relationship between regulatory agencies and their political environment, the nature and role of collegial decision-making within regulatory agencies, the relationship between regulated industries and private enterprise, and finally, problems related to compliance with regulatory decisions.

This is an extremely valuable article. It highlights questions of importance to federal level evaluations, provides references to current research in these areas, and draws useful parallels and highlights differences between the American and Canadian systems.

Kernaghan, K. (Ed) 1982. Public Administration in Canada - Selected Readings. 4th Ed. Methuen.

C4.1.3

The volume contains a collection of over 30 papers on public administration in Canada, covering such diverse topics as organizational theory, bilingualism in the public service, personnel management and administrative responsibility. An overview article by Schultz discusses some of the problems of regulatory agencies in Canada, and their role in the Canadian political system, largely from a public administration point-of-view. Schultz is concerned with the transfer of powers and responsibility from elected to appointed officials. The article concentrates on the nature of regulatory independence and political control and accountability. The basic thesis is that "regulatory agencies should not have more independence from the political process, and should have no more opportunity to apply expertise to non-technical decisions than is consistent with effective democratic government". The article's conclusion is that there should be a consistent set of controls over independent policy-making by regulation of regulatory agencies. An independent legislative function is not a necessary attribute for effective impartial regulation.

The article raises issues which an evaluator may choose to address in a wide-ranging study of the AECB and its powers, and its relationships to other arms of government.

Kilborn Ltd. and Beak Consultants. No date. An Assessment of the Long Term Suitability of Present and Proposed Methods for the Management of Uranium Mill Tailings. AECB Info. 0024.

D2.6.4

This contract report prepared for AECB is a technical assessment of three proposed alternative means of storing uranium mill tailings, and of changes to ore processing and tailings treatment techniques, tailings beneficiation, and radium-thorium removal from tailings. It is an example of the scientific work undertaken for and by AECB in fulfillment of its regulatory responsibilities and would be useful in evaluation of technical aspects of AECB's programs.

Knight, G.B. 1976. Regulatory Concerns Arising from the Port Hope Situation. AECB 1102.

D2.6.3

This document is the text of an address presented by AECB staff at a 1976 CNA conference in Toronto. It reports on the discovery and investigation of unacceptable levels of radioactive contamination in Port Hope, Ontario, as a result of long-term processing of ore in the area and discusses the establishment of a Federal-Provincial Task Force on Radioactivity to investigate the situation further. The report is an example, and indirectly an evaluation, of the work of AECB in the area of regulation of health and safety.

Knight, H.C. 1979. The Zero-Base Budgeting Process : A Practical Guide to Evaluation, Implementation, and Use. The Society of Management Accountants of Canada.

D2.4

The book provides a useful "how to" guide for Canadian managers contemplating adoption of Zero-Base Budgeting (ZBB) as a planning, budgeting, and evaluation tool. It is based on the experience of several years of observation of the successes and failures of the technique in practice. Canadian examples are taken from the public and private sectors. The book is an excellent, comprehensive reference on the use of ZBB as a budgetary and evaluation tool.

The guide attempts to allow managers:

- to understand ZBB and its implications,
- to assess its attractiveness for their own organization,
- to plan, design, and manage an implementation project,
- to provide examples of implementation in other organizations, and
- to discuss new directions.

Kraft, M.E. 1982. The Use of Risk Analysis in Federal Regulatory Agencies : An Exploration. Policy Studies Review 1(4):666-675.

D2.6.2

The paper discusses the results of a survey of U.S. federal regulatory personnel (NRC, FDA, EPA etc.) regarding present and future use of risk analysis in federal departments and agencies. It is primarily an attitude survey and discusses in part the conflicts experienced by scientists and adminstrators in quantifying risk, and the increasing use of risk analysis in politically sensitive regulatory decisions. The methods could be useful in evaluations of decision-making by AECB.

Krass, A.S., P. Boksma, B. Elzen & W.A. Smit. 1983. Uranium Enrichment and Nuclear Weapon Proliferation. Stockholm Intl. Peace Research Institute. Taylor and Francis, London.

C3.1, D2.7

Part I of this volume describes the processes of uranium enrichment and the consequent problems of proliferation control. It briefly reviews international control agreements and recommends improvements. Part II provides a very detailed technical description and analysis of uranium enrichment which is specially designed to aid regulators charged with the development and administration of control methods. The book would be useful in identifying evaluation issues and methods for AECB's safety and control programs.

Krutilla, J.V., A.C. Fisher and R.E. Rice. 1978. Economic and Fiscal Impacts of Coal Development : Northern Great Plains. Baltimore. John Hopkins Univ. Press.

C4.2.1, D2.5

This is a study of the economic and fiscal impact of coal development in the Northern Great Plains. A multi-region, multi-industry forecasting model (based on the Harris model) is developed to determine the economic and demographic impacts of a number of alternative coal development plans. The impacts are part of the data used in assessing the fiscal impacts of the various development scenarios. These scenarios and the simulated impacts on population, employment and income are described. The sources of public funds associated with coal development are reviewed and tax yields, by jurisdiction, are estimated and compared with projected expenditures on community services. Conclusions and policy implications are given. The study goes into much technical detail about collection and analysis of data and developing the models, and is very thorough in researching and calculating sources of funds and possible expenditures. This type of study could just as easily be applied to assessing the economic and fiscal impacts of a nuclear power facility. For AECB evaluators, the methods are applicable to determining intended and unintended economic impacts of a program.

Krutilla, J.V. and A.C. Fisher. 1975. The Economics of Natural Environments : Studies in the Valuation of Commodity and Amenity Resources. John Hopkins Univ. Press, Baltimore.

D2.4, D2.5

This is a synthesis of selected work undertaken in the Natural Environment Program at Resources of the Future. It addresses the valuation, allocation and management of resources of the natural environment, especially economic evaluations of alternative uses of natural resources. Part I of the book attempts to put the aesthetic aspects of environmental concerns in an economic framework. Discussed in economic terms are the importance of public lands in providing amenity services, the nature of rights to different types of resources on public land, the irreversibility of environmental decisions and the optimal use of natural environments. The economic analysis is then applied to case studies in Part II. This is a useful technical reference and the case studies and analyses would be very useful to AECB in defining problems and conducting technical evaluations of the environmental aspects of its regulatory program.

The "Hell's Canyon Study" examines the economic justification for hydroelectric power development. A critical evaluation of three proposals indicated that two would be inefficient even without accounting for environmental destruction. The third showed net benefits. Further analysis considered whether the benefits of the development were greater or less than those forgone by modifying a unique amenity resource. The special considerations that must be brought into account in evaluating the worth of preserving the Canyon are incorporated into a cost benefit analysis. Problems of measurement are addressed, and costs of alternatives are incorporated into the analyses.

The "White Clouds Peak Study" analyses the most efficient uses to which the area's resources may be allocated, a molybdenum mine-mill or wilderness recreation. The choices are mutually exclusive.

The "Mineral King Valley Study" examines the conflict of potential recreational users of the area in its analysis of the costs and benefits of developing a ski resort.

The "Allocation of Prairie Wetlands Study" is interesting as the resource at issue is composed of many private holdings in a wide area. A bioeconomic supply and economic demand model is developed which will help lead to the optimal allocation of wetlands for breeding habitat of migratory wildfowl.

The "Trans-Alaska Pipeline Study" was too vast a project and quantitative evaluation of environmental impacts or probability of environmental damage defied the analyst's best efforts. The problem of deciding whether the undertaking was worthwhile was ethical or political. This study therefore only analysed the economic and environmental costs of alternative routes.

Laframboise, H.L. 1983. In Kernaghan, K, (Ed.) 1983. Canadian Public Administration, Discipline and Profession. Butterworths, Toronto.

A5, E2

In this brilliant essay, the author lays bare the evolution of public administration and, in particular, public service management practice over the last 15 years. He reaches many conclusions that will be dismissed as cynical by those who have benefited from current trends, and whose self-interest dictates opposition to any change in direction. These are the very people who most need to reflect on his observations. There is a great deal in this paper that could benefit anyone charged with drafting an evaluation plan for a government agency, even one with a relatively simple mandate such as AECB. To give one example, the following conclusion will surprise many public service managers : "...the talents of the individual official increasingly outweigh in importance the formal job descriptions (in determining program effectiveness)..."

Law Reform Commission of Canada. 1980. Independent Administrative Agencies. Administrative Law Working Paper No. 25.

A3, A5, B3, B4.2, C2, C3.1, C4.1.1, C4.1.3, D2.1, D2.2

The paper describes and examines the historical development and growth of administrative agencies, their role in government, their legislative framework and relation to Parliament, the extent of executive control over their activities, and the role of public interest groups in their operation.

The Commission identifies a number of concerns about independent regulatory agencies that give rise to its study. These include allegations that : (i) Ministerial and Parliamentary control of the agencies is weakened by delegation of power; and (ii) it is inappropriate for those who make rules to sit in judgement on their application. In addition every person or group has a different view about the powers, mandates, responsiveness and procedures of the regulatory agencies. This gives rise to competing concerns. In assessing the validity of these concerns the Commission embraces certain values to which the Commissioners think administrative structures and procedures should conform. These are : accountability; effectiveness; economy and efficiency; fairness; integrity; authoritativeness; principled decision-making; comprehensibility; and openness. Both concerns and values, as discussed in the report, are of interest to designers of public service evaluations, most of which tend to focus exclusively on effectiveness, economy, and efficiency.

The paper is process-oriented and offers an excellent analytical description. It provides background information on the setting and relationship of agencies such as AECB in the broader government structure, and would aid in developing questions for a wide-ranging first principles evaluation. The Commission also makes many recommendations for reform of the regulatory process. These also can be useful in identifying evaluation issues and defining specific evaluation questions.

Late this year (1985) the Commission published a final report on independent regulatory agencies. It was finalized after receipt of response to the working paper abstracted here. The working paper includes detailed discussion of regulatory issues of interest to AECB whereas the final report focusses on the Commission's recommendations to Parliament. The working paper is therefore more useful to evaluators.

Law Reform Commission of Canada. 1977. Administrative Law. Commissions of Inquiry. A New Act. Working Paper 17.

D2.2

The paper is about commissions of inquiry. It gives an historical review of the present Inquiries Act and comments on the use of commissions of inquiry by Canadian Government to provide advice and as investigations. From this, desirable powers and structures are inferred. The present Act is reviewed in light of those powers and structures. A new and better Act is proposed. This will be of relevance to AECB if an inquiry approach to evaluation is adopted.

Law Reform Commission of Canada. 1975. Criminal Procedure : Control of the Process. Working Paper 15.

D1

This working paper describes the current administration of criminal law with respect to the laying of charges and pretrial and trial procedure. The description is based on legal experience and legal argument. There was evidently no interview program or specific case study, but reliance on complete understanding of current practice by the authors. This proved perfectly adequate for a searching review and for the development of recommendations for improvement. The paper provides a suitable model for internal evaluations of relatively formal regulatory processes such as those involving licensing or ajudicatory proceedings. It is an example of what Treasury Board calls the "expert review" method of program evaluation.

Leadbeater, A. 1980. Council on Administration. Administrative Law Series. Study Paper. Law Reform Commission of Canada.

B4.2, C4.1.1, C4.1.2, D2.2

This paper is about Independent Administrative Agencies and their problems. It discusses the difficulties of satisfactorily evaluating the effectiveness of regulatory programs. It underscores the importance of appropriate procedures; of personnel selection; and of appropriate fora and processes for redress of grievances against agencies.

The dilemma of agency independence without supervision, with the possibility of abuse, as opposed to agency supervision which limits the ability to act independently, is discussed in detail. A mechanism outside Parliament that could provide improved agency supervision and be responsible to Parliament rather than to a Minister is described by means of a discussion of three supervisory bodies in other countries. These are the Council of Tribunals in the United Kingdom, the Administrative Conference of the United States and the Administrative Review Council of Australia.

Leadbeater makes a number of proposals for improvement in regulatory processes. His book offers insight into the problems of an administrative agency, such as AECB. It is useful as a basis for examination of the basic structure and establishment of the agency and therefore, for defining evaluation issues.

Lecraw, D.J. 1981. Voluntary Standards as a Regulatory Device. Economic Council of Canada Working Paper # 23.

D2.6.1

The author describes the Canadian Standards System and uses eight case studies to illustrate the cost to industry of adhering to voluntary standards. The report does not attempt to estimate the benefit to industry, or to society in general, of adherence to standards, although it is presumed to be substantial. The work is applicable to evaluation of AECB's standard-setting processes and their impacts.

Leggat, R.F. 1971. Standards in Canada. Economic Council of Canada and Science Council of Canada.

B4.2, D2.6.1

This paper provides a list of Canadian Standards and a detailed description of how standards are set. It also reviews problems encountered in setting standards and in employing them in regulation. It includes a discussion of the consensus method of standard-setting, commonly used in Canada, in comparison to the simple statutory declaration in use in some other countries. It has potential value in framing questions in evaluation of technical aspects of AECB's licensing process.

Lewis, P.V. 1980. Organizational Communication : The Essence of Effective Management. 2nd Ed. Grid Publishing Inc.

C4.1.2, D2.3

To be able to evaluate the organization of AECB effectively, an evaluator must understand the communication process between managers and their peers and between managers and employees. This book is about communications within an organization such as a government agency, university or business. First, a background for understanding communication and organization is presented and workable definitions given. Flows, patterns and consequences of organizational communications are explored, and the effects of perception, semantics and organization are illustrated as barriers to the communication process. Methods for improving organization and interpersonal communications are discussed and the cornerstones of an effective communication program are set forth. The nature of communication within the organization, key management challenges and contemporary management theories are discussed. Communication and the managerial process are presented in such a way that an evaluator can determine what is right or wrong within the organization and suggest improvements.

LGL, ESL, ESSA. 1984. Beaufort Environmental Monitoring Project. 1983-1984 Report for Department of Indian Affairs and Northern Development and Department of Environment.

C3.2, D1

This report illustrates the use of systems analysis style workshops to define functional linkages between major development effects and ecosystem components considered worthy of protection for socio-economic or political reasons. Although the example is relevant to only a small part of AECB's program, the method is applicable to the analysis of the entire AECB program. Specifically, it can be used to identify the key functions or activities that determine the success of the program, and to formulate specific evaluation questions to assess that success.

Limaye, D.R. (Ed.) 1973. Energy Policy and Evaluation. Modeling and Simulation Approaches. Lexington Books.

D2.6.2

The book was written during the height of the world energy crisis of the 1970's. It presents articles which use statistical, modelling, and simulation techniques to examine various aspects of the energy supply/demand problem. The book also examines (indirectly) the problem of data reliability and availability and thus the need for, and limits to, the use of simulation models.

Some of the techniques described involve integrated models which attempt to examine multi-dimensional aspects of energy systems - cost, efficiency, environmental impact, usually for strategic planning purposes. Modelling and simulation are techniques applicable to evaluation but none of the papers go far enough in this direction to be of real value. The paper by the U.S. Nuclear Regulatory Commission (1979), reviewed in this bibliography, demonstrates a more advanced and useful application of these techniques.

Lucas, A.R. and T. Bell. 1977. The National Energy Board. Policy, Procedure and Practice. Prepared for the Law Reform Commission of Canada.

B4.2, C4.1.1, D1, D2.2

This study was conducted as part of LRC's broader study of government boards and agencies. It contains a description of the NEB, its mandate and practice, an analysis of issues arising from its operation, and suggestions for reform. Information for the study was gathered over several months of close observation of NEB at work, from a review of legislation, the literature, board reports and decisions, and examination of five case studies of applications before the Board.

The descriptive phase of the study was used to address how the Board has established policy guidelines to govern its regulatory decisions and its role and influence (and vice versa) in relation to other federal government departments, the Cabinet, the energy industry, media and the public, and the way in which it accommodates outside interests in its regulatory procedures. The second part of the study is an analytical evaluation of the Board's activities through the examination of five case studies, each of which is used to identify important issues and problems in the operation of the Board.

This reference is extremely useful as an example of the LRC approach to evaluation and also because NEB is as close an analogue to AECB in the extent of its powers and influence as can be found in the Canadian federal government.

Lyden, F.J. & E.G. Miller (Eds) 1978. Public Budgeting : Program Planning and Evaluation. 3rd Ed. Rand McNally College Publishing Co.

A1.1, A3, D2.4, E1

The volume is a collection of articles, some dating to 1952, on the evolution and current (1978) uses of Planning-Programming-Budgeting (PPB), a tool devised in the U.S. in the 1960's for evaluation of government programs from a budgetary viewpoint. The official PPB program within the Office of Management and Budget was closed in 1971 but some PPB practices and approaches have endured in other forms. The methodology was a precursor to Management by Objectives (MBO) and Zero-Base Budgeting (ZBB), both of which are also mentioned in the book.

The volume describes the budgetary process in the U.S. and the role of PPB in program evaluation. Much of the contents are too specific to the U.S. federal system and pertain too much to past events to be of use to an AECB evaluation.

Part III, however, discusses the program planning and evaluation base of budgeting, examines how programs can be designed to facilitate measurement of efficiency and effectiveness, and also examines the relationship between program planning and program evaluation. These ideas and methods are applicable to programs such as AECB's.

Deniston's article contains a useful qualitative discussion of the development of questions relating to program appropriateness, adequacy, effectiveness, and efficiency. The article also presents an evaluation model based on systematic description and measurement of each variable in a program. The model was designed for application to a public health program and cannot be used if any one variable cannot be measured and quantified. The model's use is thus limited to programs with suitably quantifiable outputs and the model in general is now somewhat dated (1968).

Marchildon, P. 1983. Le Role de la Commission de Controle de l'Energie Atomique Comme Organisme de Reglementation des Centrales Nucleaire au Canada. AECB.

B4.2

This paper reviews the major safety principles applicable to Canadian nuclear power plants and describes the Canadian licensing process and some of the requirements relating to this process. It is useful to AECB as a first step in evaluation.

Marcy, W. (Ed.) 1978. Patent Policy : Government, Academic and Industry Concepts. American Chemical Society Series 81, Washington, D.C.

C4.2.2.2, D2.6.4

This is a symposium on patent policy in government, academia and industry. There are papers on the development and present status of the United States federal patent policy, the administrative direction of government patent policy, and patent policy in government research and development contracting. A paper on patents and licensing in the petroleum industry mentions the inhibiting effect of government regulation. It would be useful in technical evaluations of AECB's regulatory programs with respect to patents.

Matthews, T. 1976. Interest Group Access to the Australian Government Bureacracy. In Royal Commission on Australian Government Administration. Appendix 2, p332-365.

C4.1.3, D2.1

Matthews begins by describing the main characteristics of interest groups. They are associations which try to persuade governments to adopt the policies they advocate by : force of public opinion, logic of reasoned arguments, threat of economic sanctions, promise of political awards or the backing of past precedent. Unlike political parties they are not willing to exercise the formal powers of government. Nevertheless, governments often prefer to deal with interest groups, especially those that fully represent a given sector of society, as a method of increasing accountability to the public.

Matthews describes the pressures for participation in government. There is a disatisfaction with bureaucracy brought about by education and the influence of the media. New cultural values, a desire to gain some control of the increasing size and complexity and pervasiveness of government, and the feeling of "rights" to service also play a part. He mentions the Government of Ontario's belief that the benefits of participation outweigh the negative consequences. The benefits are : (i) promoting self-development and learning; (ii) forcing consideration of others; (iii) promoting acceptance of a decision; (iv) promoting efficiency and economy; and (v) the opportunity to ensure that all parts of the public are represented.

Matthews reviews in detail the ways in which interest groups obtain access to government agencies and recommends methods of making access more equally available to the public. He discusses the appropriate use of four methods of allowing public participation in decision-making : consultation, negotiation, delegation of power and transfer of control of program management. These analyses are of interest to an evaluator of regulatory programs considering public accountability and public participation issues.

Maybee, A. 1984. A Review of Provincial Inspection Services. Office of Government Reform, New Brunswick Board of Management.

C4.1.2, D2.7

We were only able to obtain the terms of reference for this report. The objectives of the study were to justify existing inspection activities and to identify ways in which they, and the personnel who carry them out, might be reorganized to achieve economy and greater effectiveness. The study was responding to public complaints, the New Brunswick Fire Chiefs' Association's concerns, and the mandate of the Office of Government Reform.

Each Inspection Unit was to be studied from 13 different aspects : Acts and regulations; duplication; whether inspection is preventive, corrective or incident related; the frequency, and reasons for the frequency, of inspection used; intended beneficiaries; duties of the inspectors; qualifications of inspectors and whether appropriate; vertical and horizontal reporting relationships; the number of inspectors employed full and part time, the number required, the number of dedicated support staff and location of inspectors' bases; salary and travel costs involved; procedures used to determine quality and validity of inspection (evaluation); other functions of inspectors; and variations in regulatory requirements within the Province and the reasons for them. The study was carried out by a consultant using general scientific methods and his own judgement.

The report is relevant to evaluation of AECB's inspection programs and would help to focus on questions to be addressed when evaluating them.

Mazmanian, D.A. and J. Nienaber. 1979. Can Organizations Change ? The Brookings Institute, Washington.

C4.1.2, D2.3, E1, E2

This is a study of the Army Corps of Engineers examining changes which have taken place in its well-entrenched bureaucracy in response to pressure for environmental protection and citizen involvement. The Army Corps of Engineers made a conscious and serious effort to accomodate itself to the environmental movement and the letter of the law. A case study of the Corps is of value in suggesting the key issues that must be addressed if major changes are attempted to the organization of an agency, such as AECB. The book gauges the extent of change in objectives, internal structure, programs and decision-making and also tries to determine whether a different level of service altogether would be more appropriate to the needs and preferences of the agency's political environment. The methods would be useful to evaluations of alternative methods of achieving AECB's regulatory goals.

Mazmanian, D.A. and P.A. Sabatier. 1981. Effective Policy Implementation. Lexington Books, Mass.

A6, C4.1.1, D2.3

The book was written in response to the need for an appropriate framework within which to conduct policy implementation research, and to define the variables to be included in that research. It attempts to : outline the general stages of the implementation process between enactment and the ultimate impacts of the program; to indicate the principal set of variables and the value each must take if a program is to be effectively implemented; and to begin examining the relative importance of the principal variables within and across policy domains.

The framework is developed by Mazmanian and Sabatier in the first part of the book. Chapters in the second and third parts are by other authors. They examine one or more aspects of the framework by means of controlled comparisons and quasi experimental designs. The framework is evaluated both as a conceptual construct and as a guide to empirical research. The two chapters in the second part focus on the legal structuring of the implementation process. Baum compares the capacity and the mechanisms through which legislatures and appellate courts can structure policy implementation. Rosenbaum compares 16 different wetlands protection statutes in 14 states. He develops quantitative scales by which to rate the statutes and these provide excellent indicators of the likely implementability of a statute. This approach would be useful to an evaluation of the legislative base, including actual regulations, of AECB's programs.

The four chapters in the third part each examine the overall applicability of the framework in a different public-policy arena : desegregation; variations in the implementation of federal social programs; the evolution of federal welfare programs over the past 45 years; and an analysis of the role of statutory variables in comparing one agency, the San Francisco Bay Conservation and Development Commission (BCDC), across two regimes - one under the agency's original charter and one under the revised charter. This last study by Sabatier and Klosterman was able to compare the degree of effect the changes in objectives and agency powers had on BCDC treatment of target groups.

This book is useful to AECB evaluators assessing whether policy has been effectively implemented or whether new policy is likely to be effectively implemented. The framework developed can be applied to policy implementation in all areas. The book helps to define questions necessary for estimating the probability that a statute will achieve or has achieved its mandated objectives.

McCabe, L. 1978. Government Evaluation of Regulation : The U.S. Experience. Studies on Government Regulatory Activity. Treasury Board (Canada).

C4.2.1, D2.4, D2.5

The paper was prepared by a federal government interdepartmental group to assess the feasibility and usefulness of applying cost-benefit and other evaluative techniques to government social regulation. The Ford Administration's Regulatory Reform Program and particularly the Economic Impact Statement are examined as models and case studies of the socio-economic analysis of social regulatory programs. The group concentrated only on health, safety and fairness regulations. The study concluded in part that the methodology is technically feasible and is transferable to Canadian expenditure program evaluation in these areas. The paper provides a discussion of a methodology (the Economic Impact Statement) for evaluation of new regulations, and a potential model for assessment of the impact of future AECB regulations.

Meyers III, D. 1977. The Nuclear Power Debate - Moral, Economic, Technical, and Political Issues. Praeger Publ.

C2, D2.1

Meyers examines the rise of nuclear power as an alternative to conventional energy sources and discusses the controversial issues related to the commitment of the U.S. government to a greater dependence on nuclear power generation. Of most relevance to AECB is a chapter on the AEC regulatory process, standards, licensing and enforcement practices, and the role of public participation in nuclear-related issues. It addresses the question of whether the political and regulatory processes allow adequate review of alternatives and adequate public participation given the government's commitment (at the time) to nuclear power. It provides a valuable insight into the effect of administrative decisions on regulatory functions and the extent of political influence on quasi-independent bodies.

Miller, G.P. (Chairman) 1969. A Study of Technology Assessment. Report of the Committee on Public Engineering Policy. National Academy of Engineering, Committee on Science and Astronautics. U.S. House of Representiives.

D2.6.4

The study was commissioned to provide advice to Congress on ways it can use Technology Assessment as a tool to ensure maximum benefit to society from developing technology. Technology Assessment is defined as "the sociotechnical research that discloses the benefits and risks to society emanating from alternative courses in the development of scientific and technological opportunities".

Part I of the book describes the general methodology, types of approach, and basic questions to be answered in Technology Assessment (TA). Part II deals with more specific aspects of methodology, the steps in analysis, the importance of external factors such as task force composition, etc. Part III details three experimental TA's conducted specifically for this report.

Technology Assessment is a valuable tool applicable to a wide range of topics. Its steps are broadly defined as :

- identify and refine the subject to be assessed,
- delineate the scope of the assessment and develop a data base to solve the selected problems,
- identify parties affected by the selected problems and technology,
- identify the impacts on the affected parties,
- valuate or measure the impacts,
- compare the pros and cons of alternative strategies.

The specific means by which these steps are accomplished is left to the individual assessor and is determined by the nature of the problem at hand. The authors acknowledge that many of the steps outlined above fall into the "easier said than done" category. Much of the success of TA is attributed to the assembly of an expert task force specifically chosen for the particular problem to be addressed.

The term TA describes a specific application of what are usually standard investigative and evaluation techniques. It is actually a type of comprehensive evaluation from first principles. Its methodology is applicable to many areas of the work of AECB in evaluation of its own activities and in assessing the impact of technological advances proposed by industries under the regulation of the Board.

Miller III, J.C. and B. Yandle (Eds.) 1979. Benefit-Cost Analyses of Social Regulation - Case Studies from the Council on Wage and Price Stability. American Enterprise Institute - Studies in Government Regulation.

C4.2.1, D2.4

This is a volume of case studies taken from the work of economists on the staff of the Council on Wage and Price Stability (U.S.). The papers include inputs from attorneys as well as economists, as the studies were mostly taken from formal filings before regulatory agencies. Papers are organized into sections on : consumer and worker health; product safety; and energy, the environment, and international trade. Although most of the topics of the papers are not directly relevant to AECB, all discuss benefit-cost analysis in relation to regulation. For instance water pollution controls for the iron and steel industry and reducing airport noise are both covered. The examples of cost-benefit analysis would be useful in determining impacts of AECB's programs.

Mills, E.S. 1978. The Economics of Environmental Quality. New York, W. W. Norton and Company Inc.

D1, D2.4, D2.5

This is a textbook on environmental economics, intending to present a coherent thread of theoretical and empirical analysis. Part I presents the basic theoretical tools necessary to understand the subject. It carefully lays out a systematic analytical framework (which has been devised by economists over many decades) for analysing government pollution control programs. Part II gives technical information regarding water, air and solid waste pollution along with the resulting environmental degradation. Part III analyses, describes and criticizes the United States

Government pollution control programs in light of the factual material presented in Parts I and II. Part IV concerns foreign and global problems with examples from Japan, Sweden and Korea discussed to show similarities and differences. This has relevance to the peaceful uses of atomic energy and asociated problems.

The book is technical in orientation. It is potentially useful to AECB in defining economic and technical evaluation questions and in describing methods of answering them. The cover of technical issues and application of cost-benefit analysis is broad. The chapter on solid wastes would be interesting to AECB : it mentions materials re-use in reprocessing of uranium fuels in atomic energy plants, and uranium mining. The chapter on air pollution discusses environmental damage from electricity generation; sources of data on air pollution and its impacts; experiments with animals; data from catastrophic events; studies of effects of air quality on property values and wage rates; and cross-section studies of determinants of mortality and morbidity. There is also a chapter on water pollution which could have relevance to mining waste regulation.

Mitnick, B.M. 1982. Regulation and the Theory of Agency. Policy Studies Review 1(3):442-453.

B3

Mitnick proposes the "theory of agency" as one means of developing an integrated systems-based framework for studying and evaluating regulatory agencies. The theory is based on an analysis of relationships of "acting for" - in this case the regulator or principal interferes with the choices available to the regulatee (agent) in such a way that the agent is caused to act for goals held by the regulator. Regulators in turn can be seen as agents of the public who act for goals held to be in the common interest.

The paper describes four different theoretical roles played by regulatory bodies and also looks at the incentive systems used by principals to control agents, and in a general way, the cost and benefits of various levels of control (i.e. the relationship between intensity of regulation and performance).

This approach is an interesting theoretical model applicable to evaluation of a regulatory program such as that of AECB. It is broad enough in scope to encompass the varied responsiblities and roles of the Board and sufficiently complex to deal with analysis of the many political, environmental, social, and public interest pressures to which the Board is subject. This reference is a review article and merely introduces the theory and its potential applications. The bibliography would lead the reader to more detailed discussions of the topic.

Muller, F.W. & Assoc. 1977. A Study of NRC Quality Assurance Program. Scandian Laboratories report to USNRC, Washington. NUREG-0321.

B4.2, D1, D2.7

This contract report describes a three-month study of quality assurance procedures in nuclear power plants in the U.S. as practised by the industry and regulated by the Nuclear Regulatory Commission. Standard methodology was used, including on-site visits to plants and interviews and discussions with technical groups and individuals. While the recommendations are pertinent only to the U.S. program, the report is one of the few examples of an actual evaluation of technical regulatory procedures.

Murphy, T.P. (Ed.). 1981. Public Administration. F.E. Peacock Publishers Inc. Itasca, Illinois.

A6, C4.1.2, D2.2, D2.3, E1

This is a textbook on public administration with an interdisciplinary approach. It concentrates on the public sector, aiming to develop tools that will be effective in decision-making in program management. Budgeting is given more emphasis than other administrative components, and the political environment is also emphasized. One chapter discusses problem solving through policy and program analysis and describes 17 techniques for this. Some of the methods are applicable to evaluation of efficiency of programs such as those of AECB.

Nemetz, P., J. Sturdy, D. Uyeno, P. Vertinsky, J. Vertinsky and A. Vining. (UBC). 1981. Regulation of Toxic Chemicals in the Environment. Regulation Reference. Economic Council of Canada Working Paper 20.

B4.2, C4.2.1, D2.4, D2.6.2

This is a report about the regulation of toxic substances in the environment. It gives a summary of the environmental regulatory system and its impact on the chemical industry, with an assessment of the costs and benefits of the regulatory system and analysis of the consequences of its structure and decision processes.

It outlines the problems and policies of information acquisition, and its use for the regulation of chemical risks in the environment; the legal and institutional framework for environmental regulation of the chemical industry in Canada (mentioning over- and under-regulation) with organizational and legal analysis; and methodologies of standard-setting and some preliminary estimates of costs and benefits and risks. This latter section utilizes information gathered from the U.S. and from Canada, collected to estimate direct costs of environmental regulation to industry and indirect costs to society.

The methodology is directly applicable to AECB in terms of costs, benefits and risks associated with environmental regulation of the nuclear industry. The paper offers a basic understanding of the effects and consequences of regulation and discusses methods of assessing these.

Nielsen, The Hon. E. (Deputy Prime Minister). 1985. New Management Initiatives. Initial Results from the Ministerial Task Force on Program Review. Government of Canada.

A3, C2, C4.2.1, D2.2

The mandate of the Task Force is to bring forth for Cabinet consideration a set of proposals to restructure government programs so that they can be better managed and serve Canadians in a more effective way. A review of 1000 government programs is being undertaken in the context of the government's economic imperatives. Expenditure and tax measures are being studied and a representative cross section of the private sector's knowledge, experience and expertise are being brought to bear on the subject of federal programs and services.

Study teams were set up to look into different areas. These will cut across departmental lines as they look into common groups of beneficiaries or related objectives. A Private Sector Advisory Committee was formed from representatives from business and industry. Study teams are led by senior executives of the civil service or from the private sector, and half the members of each study team are nominees from the Advisory Committee. The teams are trying to identify programs which might be eliminated, reduced, consolidated or changed. When any are identified teams will recommend what changes are needed in the legislation, and examine how proposed changes would affect government resources in that area. Teams examine program beneficiaries for areas of overlap, gaps and omissions. The methods and areas of questioning used by the study groups in the different programs vary slightly, but are basically the same. The groups report back to the Advisory Committee, which, in turn, report to the task Force Ministers who then report to Cabinet.

The report outlines what the Government will do as a result of team investigations of : Services and Subsidies to Business; Training, Job Creation and Employment Programs; Agriculture Programs; and Indian and Native Programs. Other teams have not yet finished their investigations. AECB is likely to be affected by these Nielsen evaluations.

Nix, F.P. and A.M. Clayton. 1980. Motor Carrier Regulation : Institutions and Practices. Economic Council of Canada Working Paper E/11.

C4.1.1, B4.2

This report describes all aspects of the regulation of the motor carrier industry including the implementation of the regulatory process. It reviews legal, political and philosophical issues in rate regulation and enforcement. This part of the report would be useful in identifying evaluation issues with respect to enforcement of AECB's regulations.

Noll, R.G. 1971. Reforming Regulation : an Evaluation of the Ash Council Proposals. Brookings Institute, Washington.

C3.1, D1

This paper presents a critical review of the methods and recommendations of the Ash Council (see Ash, 1971, this bibliography). It provides a summary evaluation of economic regulation and "product and process quality control" by U.S. regulatory agencies. The evaluation is based on documented regulatory failures, and it is used to diagnose the causes of regulatory problems as seen from the perspective of political economics. Activities of a number of agencies, commissions and boards are reviewed, including several which have mandates similar to those of Canadian independent regulatory agencies. In the course of this review, criteria for judging an agency efficient and effective emerge. The report then reviews a variety of recommendations for regulatory reform, including those made by the Ash Council, in the light of its findings. The evaluation criteria identified by Noll reflect the perspectives of an evaluator who belongs to neither government or regulated industry, but they are still worthy of consideration in AECB evaluations.

Ontario. 1985. The Commission on the Regulatory Control of Mobile PCB Destruction Facilities. Report of the Commission.

C4.2.2.1, D2.2

The Commission was established to hold a public hearing on the regulatory and administrative program proposed by the Ministry of the Environment (Ontario) for the establishment and operation of mobile PCB destruction facilities on temporary sites in Ontario, and to make recommendations to the Minister regarding these matters. The report discusses the background to PCB's in Ontario, the present law and policy, the proposal and key issues including health effects, safety, regulation and administrative practice. The rationale for the recommendations is given first. This covers : technical and site application and approval requirements; standards for operation and maintenance; and the role of the Minister of the Environment. This is followed by the recommendations.

Included in the appendices is a very detailed account of the public participation in the proceedings. First a discussion paper was circulated to municipalities, public utilities, a variety of interest groups and potential proponents. A task force which was formed to develop the regulatory proposal met with communities, industries, utilities, public interest groups and labour representatives. As a result, revisions were made to the proposal. Public sessions were held in communities with the greatest PCB concentrations. The formal hearings were advertized widely and the advertisements mentioned the availability of funding for participants. An application form and criteria for funding are included in the report. The topic (hazardous materials), the method of defining permit conditions, and the public participation aspects are all relevant to AECB's regulatory program.

Ontario. 1983. Responsible Trucking : New Directions. Final Report of the Ontario Public Vehicle Act Review Committee.

C4.1.1, E2

This report contains the advice of the Public Vehicle Act Review Committee to the Minister of Transportation and Communications (Ontario) respecting the general direction in which the Province should develop new legislation for the economic regulation of the for-hire trucking industry in Ontario. The Committee was appointed by the Minister to address the problem of how to reform the antiquated Public Commercial Vehicles Act. The Report records the consensus of the Committee on : the objectives and principles for regulation; the general mechanisms by which to achieve the objectives; and the implementation of the transition to the new legislation. Details of the review process, terms of reference and a background of the history and concerns of the industry and its regulation in Ontario are also given.

This is of interest to AECB as a method of evaluating economic regulation of a regulated industry.

Ontario. 1982. Manager's Guidelines to Managing by Results. MBR Improvement Project. Management Board Secretariat.

C4.1.2, D2.3, E1

This publication summarizes for managers at all levels of the Ontario public service, the Managing by Results (MBR) concept and its application. It outlines an approach to the identification and description of program results. It is a follow-up document to "Managing by Results - a Way of Managing" published by the Management Board Secretariat in 1981.

These guidelines explain the concept of MBR, which is a type of output-oriented approach to measuring performance within organizations. It does not have a set of specific procedures prescribed for it (as do Managing by Objective and Planning, Programming, Budgeting System) but rather is an attitude which is integrated into the management cycle of : evaluating and setting directions; planning and allocating; organizing and staffing; motivating and directing; and monitoring and maintaining direction. It is particularly relevant to a manager's planning and control functions. It makes important distinctions between program effects and program outputs and operational outputs. The guidelines also explain the place of MBR in the Ontario Government-wide planning and control process; the roles of the manager and staff analyst in identifying appropriate results and strengthening the results orientation of ministry programs; a general approach to be used to identify and describe results; and the advantages of MBR to the manager and the program.

It is of interest to AECB as it is a program already being used, and is another way of evaluating organizational effectiveness.

Ontario. 1981. Advisory Council on Occupational Health and Occupational Safety. Introduction to the Third Annual Report. Ministry of Labour.

C4.2.2.1, C4.2.2.2, D2.6.2, D2.6.3

The Advisory Council is an independent agency established under the provisions of the Occupational Health and Safety Act of Ontario. The Council is interested in learning how the provisions of the Act are being applied and how effective they are in : (i) reducing accidents and exposure of the workforce to health hazards; (ii) ensuring the degree of worker participation required; and (iii) ensuring effective and appropriate participation of Ministry of labour staff. To this end, the Council held a series of meetings seeking the perceptions of groups on how well the Act was working. The meeting in Thunder Bay is detailed in this report.

Issues raised covered 10 areas : information and communications; education and training; the role of the Health and Safety Committees; the role of the Ministry of Labour; the right to refuse to work; light duty for injured workers; the performance of smaller companies; health care personnel; supervisors; and which workers should be represented on the Committees. The Advisory Council established a Task Force in 1984 on the Implementation of the Occupational Health and Safety Act, which is at present (1986) conducting a survey by questionnaire of the joint Health and Safety Committees.

This is of interest to AECB as it is an evaluation of the effectiveness of an Act covering occupational health and safety, an area in which AECB has responsibilty.

Ontario. 1978. A Race Against Time. Report of the Royal Commission on Electric Power Planning. Chairman : A. Porter.

C3.1, C4.1.1, C4.2.2.1, D2.2

The report is a summary of the findings of the Royal Commission following public hearings, commissioned studies, and other investigations into nuclear power as a source of electrical generating capacity in the future in Ontario.

The report covers all aspects of the nuclear question from demand for electricity in the year 2000, the CANDU fuel cycle, environmental, health and safety concerns, the economics of nuclear power, social impacts and issues, uranium resources, and regulation.

This report is of particular interest to AECB as it demonstrates the use of the Royal Commission methodology to evaluate the issues and practices of the nuclear industry in Canada. The chapter on regulation is particularly relevant. It examines regulatory reforms proposed by both the proponents and opponents of nuclear energy - the latter to open the regulatory process to allow continued debate and improve regulatory accountability, and the former to streamline the regulatory process and remove jurisdictional uncertainty. The report highlights potential jurisdictional conflict caused by division of legislative powers between federal and provincial governments in the environmental field. The authors also discuss criticisms arising from the close ties between AECB and the industry, the "openness" of the regulatory process, standard-setting, licensing, compliance, and public liability.

It is a report with which AECB is undoubtedly familiar and represents the state of the nuclear debate in 1978.

Ontario. 1976. Report of the Royal Commission on the Health and Safety of Workers in Mines.(The Ham Report) Attorney General's Department.

C3.1, C4.2.2.1, D2.2, D2.6.3

The Ham Commision was set up to investigate working conditions in Ontario mines, to identify the risks to miners from silicosis, lung cancer and other occupational hazards, and to review the basis on which Workman's Compensation Board decisions relating to the environmental health of miners were made.

The Commission followed standard Canadian public inquiry practice - it held public hearings, received briefs and presentations by concerned parties, conducted its own research into areas of particular interest to the Commissioners, and travelled to various mines in the Province.

The report's first chapter identifies the agencies concerned with the health and safety of mine workers, illustrates the types of injuries and health problems commonly experienced, and describes the policy issues which were dealt with in the rest of the report.

Subsequent chapters are case by case studies of particular health problems, including silicosis, lung cancer from ionizing radiation, accidents and injuries, and others such as the effects of chemical agents and noise. The final chapter contains recommendations to AECB, to the province on policy in the area of occupational health and safety, and also recommendations for the mining industry.

Chapter 3, dealing with the effects of ionizing radiation, is of particular interest to AECB, though the material is of course familiar to the Board and was, in some cases, provided by it to the Commission. The historical record of mine conditions is described, as are the jurisdictional problems arising between AECB, provincial authorities, the unions, and mine operators. Several recommendations are made for action on the part of AECB, particularly as regards the determination of the extent of health risk, methods of measuring exposure, safe exposure levels, development of programs for monitoring the exposure of mineworkers, and the temporal and spatial distribution of radiation in mines and mills. Considerable discussion is included on the setting of standards for radiation exposure, available data, assessment of the cancer risk, as well as operational matters such as worker rotation, medical surveillance, and the role of the Workman's Compensation Board.

The report is detailed and its recommendations are far-reaching and well-defined. It is an example of the public inquiry methodology used to evaluate the overall performance of regulatory agencies and government departments (both federal and provincial) in the area of occupational health and safety.

Organisation for Economic Cooperation and Development. 1977. Proceedings of the Specialists Meeting on Regulatory Inspection Practices in Nuclear Power Plants. Parts I & II. Committee on Safety of Nuclear Installations. Sub-committee on Licensing. CSNI Report No. 27.

D2.7

This volume reports descriptions of nuclear power station inspection practices in Canada, France, Italy, F.R.G., U.S., Finland, Spain, and the U.K. It provides a useful background reference for the evaluation of inspection and enforcement practices.

Organisation for Economic Cooperation and Development. 1972. Problems and Instruments Relating to the Allocation of Environmental Costs. Environment Directorate, OECD. Paris.

C4.1.3, D2.4, D2.6.1

The paper presents an economically- based theoretical discussion of methods of allocating environmental costs and then, through case studies, looks at the relative success of the various instruments. It deals with environmental effects as externalities to the prevailing economic decision-making process and examines ways to internalize the costs of environmental protection equitably. It addresses the question of whether resources can be managed on strictly economic grounds or whether imposed regulations are necessary. Standards are discussed as one means of allocating environmental costs and managing resources. The methods are useful to evaluators attempting to estimate the economic impacts of AECB's regulatory program.

The paper places regulation for environmental protection and safety in a broader context and provides excellent background to the evaluation of standards and the interaction of regulator, the regulated, and the economic system as a whole.

Palumbo, D.J. & D. Nachmias 1983. The Preconditions for a Successful Evaluation : Is There an Ideal Paradigm ? Policy Sciences 16:67-79.

A2, A3, C4.1.2, E2

The article questions whether the most commonly used paradigm for evaluation research - "the assessment of achievement of program goals through rigorous quantitative research with immediate impact on policy and practice" - is still the most appropriate today. It advocates a more integrated approach with greater congruence between theory, methods, and practice. The authors examine four aspects of evaluation research : the relationship of evaluation to decision-making; methodologies for conducting evaluations; the links between methodologies and organizational behaviour; and the relationship between evaluators and program managers - as well as new trends in each of these areas.

In briefly discussing methodologies, the authors identify a trend away from quantitative evaluations to more qualitative approaches. In discussing the need for congruence between methodologies and organizational decision-making they emphasize that successful evaluation depends on a realistic assessment of the way the organization makes decisions. If, as in the ideal case, established goals and analyses of a situation are followed by action, then a goal-directed paradigm is applicable. This is the traditional approach, one founded in social science research methods. If, however, as in many organizations, managers act and evaluate and analyse after the fact, a goal-directed paradigm is not applicable. The authors list preconditions for each type of evaluation and suggest that the latter is more appropriate for many organizations today.

The article is important to the design of an AECB evaluation program. It highlights conceptual issues which affect the success of an evaluation, causes the commissioning agency to think about the ultimate outcome of the evaluation in terms of policy and program decisions, emphasizes the importance of evaluability assessment in the design of a program, and in general provides an extremely useful reference for new trends in evaluation research.

Pannell, B.J. and F.R. Campbell. 1980. Three Mile Island - A Review of the Accident and its Implication for CANDU Safety. AECB.

C3.1, C4.1.1, C4.2.2.2, D1, D2.6.3, D2.6.4

This is a review of the Three Mile Island accident using information obtained mainly from ten reports published by several agencies in the United States. It describes what happened, beginning with the station design and followed by the sequence of events, the core damage and releases from containment. Factors that contributed to the accident are discussed. These include the degradation in plant conditions, design deficiencies in the equipment and system design as well as in the instrumentation, operator actions, equipment failures and inadequate safety analyses. Implications for CANDU and recommendations to AECB are covered next. These fall into the same general categories as those discussed in the section on contributing factors.

An analysis of an actual nuclear accident is very useful in providing insight into the weaknesses of a system, equipment and human behaviour. By comparing the AECB system with that of Three Mile Island, AECB will have information which can help to improve its own system.

Patton, M.Q. 1980. Qualitative Evaluation Methods. Sage.

A6, D1, D2.1, E2

This book about qualitative evaluation methods is not a "recipe" book telling the reader how to evaluate, as the author feels that the nature of both evaluation research and qualitative methods makes this inappropriate. Suggestions about methods are integrated with suggestions about alternative approaches to evaluation. The book offers a definite point-of-view about evaluation and does not carefully balance alternatives and give equal weight to all points-of-view. The perspective of the book is grounded in the observation that much of what passes for evaluation research is not very useful; that evaluation research ought to be useful; and that changes must be made in the methods employed if it is to be useful.

The book is in three parts. The first deals with conceptual issues. It discusses the nature of qualitative data (these provide depth and detail through direct quotation, careful description or open-ended interviews) as opposed to quantitative data (which have to fit in a standardized framework). It discusses the application of qualitative methods to program evaluation and provides a useful checklist of evaluation situations for which qualitative methods are appropriate. Evaluation designs are discussed, including evaluating the evaluation. The second part of the book deals with collecting qualitative data through observation and interviewing, discussing what to observe, fieldwork, what questions to ask, the wording of questions and the recording data. The third part deals with data analysis, including qualitative analysis and interpretation. The appendices contain a code book for content analysis of interviews with decision-makers and evaluators.

The book is useful for an evaluator evaluating those programs or parts of programs that are not quantifiable. It is therefore applicable to many parts of the regulatory process.

Pearse, P.H. 1982. Turning the Tide : A New Policy for Canada's Pacific Fisheries. Final Report. The Commission on Pacific Fisheries Policy.

C4.1.1, D2.2

The report documents the findings of the Pearse Commission, set up to investigate ways of improving the condition of Canada's Pacific fishery and to make recommendations on major issues of government policy regarding the fisheries industry. The inquiry was a "fire-fight" to salvage the industry in the face of declining stocks and major economic and political questions about its future viability. Standard methods were used. The resource, the industry itself and current regulatory policies were described and public hearings were held. The report identified the need for fundamental policy reform following years of indiscriminate "overlaying" of regulations which resulted in practices no longer suited to modern needs and conditions.

The report is an example of the public inquiry method used to provide options for the solution of pressing problems, and to bring issues and possible solutions to the public's attention. It illustrates the use of this technique at its best, and highlights the need for regulatory agencies to periodically assess their programs to keep abreast of current situations and needs. The treatment of the effectiveness of regulatory programs and the methods used would be of interest to AECB.

Penelle, G. 1985. La Reglementation Nuclaire en Belgique. Revue IRE Tijdschrift, Vol. 9, No.1.

B4.2

This is a description of nuclear regulation and standard-setting in Belgium. The legislation covers a number of aspects of nuclear power such as standards for maximum admissable exposures, doses and contamination, transportation of radioactive substances, medical applications of ionizing radiation etc. A general description of the legislation is given first, specifying the responsibilities of the different organizations involved. This is followed by a description of how this is implemented in relation to the authorization and surveillance of nuclear installations. This is useful to AECB as an example of a description of a regulatory program, which gives a basis for defining evaluation issues.

Peters, G.H. 1973. Cost-Benefit Analysis and Public Expenditure. Eaton Paper 8, 3rd. Edition. Institute of Economic Affairs.

D2.4

The paper discusses the use of cost-benefit analysis (CBA) as a basis for public expenditure decision-making in Britain. The background to the development and use of CBA and its fundamental concepts are outlined. The greater part of the paper is devoted to analysis of applications of CBA - to water resource development studies in the U.S., to British transport studies of the M1 (London to Birmingham motorway) and an extension of the London subway system, to land-use and town planning problems, and to military defence and health and education services. The thread that connects all of these case studies is the difficulty of ascribing monetary values to social costs and benefits. The problem of externality is also examined.

The paper provides a useful description of a variety of applications of CBA within a governmental system similar to that of Canada and an assessment of the strengths and weaknesses of the technique for specific uses. The author concludes that CBA is not a tool that can be widely applied, nor is it the all-encompassing answer to many diverse problems of allocation and policy that it was thought to be. This conclusion is an important one for designers of AECB evaluation programs.

Peters, J.E. 1982. Wildlife Management : Adequacy of and Problems in Regulation. Regulation Reference Working Paper No. 27. Economic Council of Canada.

B4.2, D2.4

The report examines the effectiveness of laws and regulations in the area of wildlife management. As no comprehensive database existed, the author developed a picture of the situation from publications on wildlife and wildlife management and from interviews with officials of private and government agencies. The methodology for evaluation of the legislation and regulations used standard techniques of inquiry and analysis. The report discusses the difficulties associated with monetary and qualitative methods of valuing the wildlife resource and looks at the existing wildlife related laws and their goals and objectives in Ontario and B.C. He also discusses problems such as poaching and habitat alienation, and methods of enforcement.

The report is of some interest to AECB as it evaluates regulation in a highly visible, highly public-oriented area in which the placing of values, financial and non-financial, on program impacts is very difficult.

Pleeter, S. (Ed.) 1980. Economic Impact Analysis - Methodology and Applications. Martinus Nijhoff Publishing.

D2.5

Many authors have advocated the use of economic impact analysis to determine the effects of new regulations on an industry. This volume of collected articles examines various regional economic impact models. Pleeter in an overview article discusses many current models under three major categories - economic base, econometric, and input-output models. These models have two basic elements - an estimate of the differential stimulus (the direct impact) and a model of the regional economy that will produce estimates of the indirect effects. The other papers in the volume discuss specific models and their applications but none deals with a regulatory example. The volume describes techniques which could be of use in determining economic impacts of regulatory programs. The papers, however, are probably too technically oriented for the non-specialist.

Pois, J. 1979. Watchdog on the Potomac: A Study of the Comptroller General of the United States. University Press of America.

A3, B4.2, C4.1.1, D2.1, D2.4

The author presents a wide-ranging account of the powers and activities of the Comptroller General and the General Accounting Office (GAO). He examines the role of this powerful agency in relation to Congress and the Executive, and its statutory power base, and discusses with case study examples the extent of the responsibilities and influence of the GAO on government in the U.S.

The book is an evaluation of the Comptroller General's function and the GAO following the descriptive, legally based model exemplified by the Canadian LRC studies. The author is intimately acquainted with the subject matter and draws on case studies as examples of the exercise of GAO powers, and the way in which those powers have evolved. On another scale, the report looks at the work of the GAO as an audit and evaluative agency, which assesses programs and expenditures and reports to Congress and the Executive, thereby influencing program and policy decisions. The report is exceptionally well done, detailed and informative, and an excellent example of descriptive evaluation methodology. It also identifies issues and discusses methods applicable to evaluating the efficiency of an agency such as AECB.

Poister, T.H. 1978. Public Program Analysis. Applied Research Methods. University Park Press, Baltimore, Maryland.

A6, C2, D1, D2.1, D2.4

This book is designed to provide instruction in research methods as applied to the analysis of public programs. It provides an overview of the relevance of information developed by program analysis, the range of criteria and research approaches employed in evaluating program performance, and the principal kinds of considerations to be taken into account in the design of program analysis. It tries to teach the skills needed to do program analysis and assess the merit of analytical work. The book integrates quantitative analysis with the more qualitative aspects of problem definition, general research design, development of measures and data collection procedures. It illustrates applications of quantitative techniques to investigate needs and demands for public programs, the internal operations of public programs and their impact on their environment. It uses hypothetical illustrations and examples from existing studies of programs in different areas of government. It places a strong emphasis on the relationships that such issues as problem specification, development of operational measures and research design bear to appropriate applications of statistical techniques. Unlike most statistical books it attempts to link what data to collect with how to analyse the data. In discussing statistical techniques, attention is given to the mechanics and applications, and limitations and advantages of the methods.

The chapters in the first section define program analysis and discuss the problems of formulating research questions and developing valid measures. The use of a systems approach in the development of a conceptual framework for structuring program analysis is given some emphasis. The second section deals with statistical analysis and sampling, with importance given to the discussion of analyses with two or more variables. The third section discusses various general approaches to applied program analysis including benefit-cost and cost-effectiveness analysis, experimental and quasi-experimental models, cross sectional analysis and survey research. The fourth section deals with more advanced statistical techniques.

This is a useful text for quantitative analysis of public service programs. It helps formulate questions and offers a variety of methods of obtaining precise evaluation answers. The approach and methods would be applicable to the quantifiable elements of AECB's programs.

Posner, R.A. 1981. The Economics of Justice. Harvard Univ. Press, Cambridge.

C2, D2.2

This is a non-technical book of essays on the economic analysis of law, especially law concerned with regulating non-market activities. The different parts of the book are connected with each other through a common origin in positive economic analysis of law and through a convergance on the economics of uncertainty both as risk and as ignorance.

Part I deals with the relationship between the concept of efficiency as wealth maximization and an acceptable concept of justice. It argues that efficiency is an adequate concept of justice that can plausibly be imputed to judges, at least in common law adjudication. The reasons for this conclusion reconcile the efficiency theory of the common law with the group of redistributive theories dominating current economic analyses of legislation. This part also attempts to explain the differences between economics and classic utilitarianism as guides to legal and political action.

Part II deals with the social and legal order of primitive and ancient societies exploring whether the economic theory of common law ought to be able to explain the law of primitive societies, and whether the study of primitive law might illuminate questions on the positive economic analysis of common law. Part III develops an economic theory of privacy and related interests and asks whether the relevant common law doctrines are consistent with the theory. It further illustrates the power of economics to explain legal doctrines far removed from the usual economic activities. Part IV discusses an anti-efficiency concept of justice focussing on reverse discrimination which is embodied in the constitution and is economically inefficient. It provides evidence that although efficiency can explain common law doctrines it seems not to explain some important constitutional rules.

The relevance of this book to AECB evaluations is in the analysis of program objectives and the examination of alternative methods of achieving them.

Posner, R.A. 1977. Economic Analysis of Law. Little Brown and Company.

C2, C4.1.3, D2.2

Posner examines economic principles that underly the law and economic objectives that influence its form. He forces the reader to confront economics as a practical tool for analyses which have a broad application to the varied problems of the legal system. These analyses include some stimulating ways of examining the real objectives of regulations which are of potential use in the identification of evaluation issues. There is a deliberate absence of economic jargon in the book.

There are several sections in the book which would be of specific interest to AECB. The chapter on public utility and common carrier regulation discusses such things as incentive regulation; regulation of entry and rate structure - "regulated competition"; taxation by regulation; the demand for regulation; and problems arising from attempting to limit a regulated firm's profits. A chapter on the choice between regulation and common law discusses safety and health, and pollution. The section on legal process discusses administration, including administrative agencies; the process of legal rule-making; the market, the adversary system and the legislative process as methods of resource allocation.

Posner, R.A. and K.E. Scott. 1980. Economics of Corporation Law and Securities Regulation. Toronto, Little Brown.

C4.2.1

This book is a series of economic readings on corporation law, securities regulation and corporate reorganization. Chapter 11 is the most relevant to AECB. It gives an assessment of the Securities and Exchange Commission. A paper by Stigler evaluates the consequences of the SEC's disclosure regulations, particularly as they affect the sale of new issues. It attempts to measure empirically whether investors in new stock issues had benefitted from the institution of disclosure requirements. The paper's contentions are rebutted by Friend and Herman. Another appraisal of SEC, by Benston, tries to measure the effects of formal reporting requirements imposed on listed companies. He uses financial techniques to see if this was of value to investors. His findings are rebutted by Friend and Westerfield. This series of papers is interesting as an example of a legally based method of analysis of the performance of a regulatory body and as an attempt to precisely identify impacts of regulation on the public.

Price, J.L. 1968. Organizational Effectiveness : An Inventory of Propositions. Richard D. Irwin Inc.

C4.1.2, D2.3

This is a book about the effectiveness of such organizations as government agencies, businesses and universities. Effectiveness is defined as the degree of goal achievement. The goal of the organization used here is not the official goal, but the operative goal which focusses the study on the major decision-makers in an organization. Diverse measures of effectiveness are used including data on productivity, morale, conformity, adaptiveness and institutionalization, but with most weight being given to productivity as a measure of effectiveness.

The book is laid out as an inventory of propositions taken from an analysis of 50 studies on administrative organizations. These studies contained information about the effectiveness of the organization, were fairly lengthy and were based on primary sources of information. Examples of propositions discussed are : "Organizations which have a high degree of communication are more likely to have a high degree of effectiveness than organizations which have a low degree of communication"; and "Organizations which have a high degree of autonomy are more likely to have a high degree of effectiveness than organizations which have a low degree of autonomy". Each proposition is critically analysed and summaries and conclusions are given. The material is categorized under four headings - the economic system, the political system, the control system and population-ecology. This would be a useful book for evaluators of the organization of AECB as it states the characteristics of an effective organization as deduced from the analyses, and discusses the reasons for the deductions.

Priest, M. 1982. The Provision of Information in the Context of Regulation. Economic Council of Canada Report # 22.

B4.2, C4.1.3

The author defines the following questions related to freedom of information about regulatory processes :

(i) What are the information needs of regulation?
(ii) What are the advantages and disadvantages of regulating by mandating disclosure of information?
(iii) What burdens are placed on the private sector by government requirements for information?
(iv) What criteria should govern disclosure of information?
(v) What role does information disclosure play in ensuring the accountability of regulators to regulated firms and individuals, to the general public and to Parliament?

These questions, and Priest's discussion of them, are clearly relevant to evaluations of AECB's regulatory process and of AECB's responsibilities with respect to security of classified information.

Proudfoot, S. 1980. Private Wants and Public Needs : The Regulation of Land Use in the Metropolitan Toronto Area. Economic Council of Canada Working Paper # 12.

B4.2, D2.4

The study examines the land-use approvals process in Toronto and Mississauga with emphasis on the length of the approval process and the level of direct costs imposed by the municipality on the applicants. Data were collected from municipal records, and analyses followed standard simple statistical methods to examine how time and cost parameters in the approval process have changed over a ten year period from 1967-1977. A qualitative assessment was then made of the factors influencing time and cost and an attempt (again qualitative) was made to assess if the benefits of regulation are worth the costs incurred.

The study highlights some important questions of cost/benefit distribution, equity and efficency which must be addressed in evaluation of a regulatory process, including that of AECB.

Quebec. 1985. Ministere de l'Environnement. Rapport Annuel 1984-1985. Gouvernement de Quebec.

B4.2

This document gives a description of the organizational structure, manpower, financial resources and objectives of the Minister of the Environment of Quebec for 1984-85. The first part describes the role of the Minister, his priorities and achievements. The second part emphasizes the main concerns and achievements of the Department in 1984-85 and announces its direction for 1985-86. The annex contains a list of the laws and regulations administered by the Department. This is useful to AECB as an example of a description of a regulatory program, from which evaluation issues can be identified.

Ray, A. 1984. Cost-Benefit Analysis - Issues and Methodologies. World Bank Publication.

D2.4

The book is a comprehensive, current, and econometrically based review of cost-benefit analysis (CBA) techniques, particularly as an evaluation tool for application to large public sector investment projects. It deals with specific detailed aspects of CBA such as factor weighting, valuation functions, and discount rates. The book is an advanced technical reference for those well acquainted with the use of CBA.

Rees, W.E. 1980. Environmental Assessment and Review : the Case of McKinley Bay. Northern Perspectives 8 (2), pp 2-12.

A3, D1

This is a rare example of a case study evaluation carried out for a Canadian interest group. The work was sponsored by the Canadian Arctic Resources Committee. It offers a detailed account of how a decision was made to allow Canadian Marine Drilling Ltd. to dredge an approach channel to McKinley Bay in the Beaufort Sea. The actions of the company and of the many Federal and Territorial Government groups involved are described and critically evaluated. Recommendations are made for improvement of the regulatory process.

Reid Crowther and Partners Ltd. 1980. Hazardous Wastes in Northern and Western Canada - Assessment of Need, Vol. 1; - A Need for Waste Management Strategy, Vol.2; - Development of a Waste Management Plan, Vol. 3. Technology Review. Environment Canada in Association with the Governments of B.C., Alberta, Saskatchewan, Manitoba, Ontario, Yukon and the Northwest Territories.

B4.2, D2.6.2, D2.6.4

These three volumes report on a study undertaken to determine the need, possible methods, costs, and environmental impacts of an integrated program for the management of hazardous wastes in northern and western Canada. The report also contains : evaluations of the need for the program; evaluation of existing procedures for handling, storage, transportation, and disposal of hazardous material; and an evaluation of existing legislation concerning hazardous waste management.

Volume I (assessment of need) describes the development of a classification system for hazardous materials (excluding radioactive material), an inventory of existing data, the rates of production and locations of sources and disposal sites in Western Canada. It describes and evaluates existing transportation and disposal practices and experience in other countries.

Volume II presents a detailed review of current and soon-to-be-available technologies for use in a waste management system, ranging from biological and chemical treatment methods to incineration and recovery and long-term storage.

Volume III contains a discussion of the results of evaluations of current practices and the planning details of a comprehensive waste management system for western Canada. The plan evaluates alternative waste management systems, discusses problems of siting treatment facilities, and presents an implementation program and a preliminary transportation risk analysis for hazardous waste in western Canada.

The report is an extremely comprehensive feasibility study. The evaluations of current practice are based on standard methods - largely reviews of actual occurrences, accident reports, and actions taken by regulatory agencies. The approach is a useful model for dealing with a highly visible, controversial, and potentially dangerous and expensive problem.

Reschenthaler, G.B. 1978. Direct Regulation in Canada : Some Policies and Problems. In : W.T. Stanbury (Ed.) Studies on Regulation, pp. 37-112. Institute fo Research on Public Policy, Montreal.

C4.1.1

Reschenthaler identifies a host of problems encountered in direct regulation. Among these are : "capture" of the regulatory agency by the regulated industry; inadequate staff and resources for the regulators; failure of the consumer interest to organise and to participate in the regulatory process; in adjudication, a tendency to sustain or protect the regulated industry on which the regulatory agency depends for its existence; restriction of the rate of technological change; and too little emphasis on operating efficiency and the overriding of regulatory or economic goals by short-term social goals that are politically attractive. As an example of the latter, the author quotes the use of price discrimination to change the distribution of income. Although most of the examples in this paper are from economic regulation, the issues with which it deals are likely to arise in the course of regulation by an agency such as AECB and are relevant to its evaluation.

Reschenthaler, G.B. 1972. Performance of Selected Independent Regulatory Commissions in Alberta, Saskatchewan and Manitoba. Canadian Consumer Council, Ottawa.

A3, A5, B3, C2, C4.1.3, D1

The study deals mainly with economic (price setting) agencies. It discusses the rationale for creation of independent regulatory agencies and identifies expertness of board members and independence from special interest as key features. The author uses three criteria as a basis for defining his concept of ideal performance by independent regulatory agencies, and proceeds to evaluate prairie boards and agencies against these criteria. The author's thorough approach and definition of ideals is useful to any evaluator of regulatory programs who has to define evaluation criteria. It is, in fact, one approach to defining the "public interest" which independent regulatory agencies are supposed to serve.

The methods used in this report are analytical descriptions of the mandates and modes of operation of the agencies, and case studies based largely on document review. The composition of the boards, their procedures and performance are assessed against the ideals defined by the author. Comparisons are also made between boards and agencies with similar mandates in different provinces. Evaluation criteria and methods used in this study are of interest to AECB.

Rhodes, G. 1975. Committees of Inquiry. Prepared for the Royal Institute of Public Administration, London. George Allen & Unwin Ltd.

D2.2

This book is one of a series sponsored by the Royal Institute of Public Administration (Britain). It seeks to establish a general framework for comparative analysis of committees of inquiry by examining committees of inquiry appointed during a ten year period from 1959-68. It deals with the circumstances in which committees are used, their distinctive characteristics and the consequences of committee reports - bearing in mind that they are not the only means by which government may seek help in resolving problems. It is, in fact, an evaluation assessment. One chapter outlines, with examples, the form an analysis should take to find the contribution of committees of inquiry and the extent to which policies are evolved by other means. The book would be useful to AECB if it decides to use a committee of inquiry to conduct an evaluation.

Richardson, D.K. 1976. The Cost of Environmental Protection - Regulating Housing Development in the Coastal Zone. Center for Urban Policy Research Rutgers - State University of New Jersey.

C4.1.3, C4.2.1, D2.5

The book examines the problem of "overlaying" land-use regulation in the coastal zone of New Jersey. Responsibility for land-use control has consistently been shifting to higher levels of government in an attempt to institute comprehensive planning and to ensure effective resource management. The paper analyses present regulatory procedures in the coastal zone with emphasis on the costs of state and local regulation to land developers and consumers.

The methodology follows a standard approach based on analysis of records and interviews with developers and officials involved with 21 coastal developments in one county in New Jersey. The report is an example of analysis of one of the problems facing any regulatory agency today - the perception of costs and inconvenience in dealing with multi-level regulations. It is useful to AECB as an example of an attempt to determine the cost of regulatory compliance and its economic impact.

Rohlich, G.A., and R. Howe (LBJ School of Public Affairs). 1981. The Toxic Substances Control Act : An Overview and Evaluation. Economic Council Of Canada Working Paper 21.

B4.2, C4.2.1, C4.2.2.1, D2.2, D2.6.2

This is a report reviewing the United States experience in drafting and implementing the Toxic Substances Control Act, and identifying key issues emerging from this experience. A brief history of the Act is given first. Risk determination in toxic substances regulation is explored. It is addressed in terms of economic impacts (the costs to industry and consumers) and health and environmental effects. The chemical's potential effects on human health and environmental systems, and the extent and routes of exposure and environmental release must be assessed in a social and economic context to determine an acceptable level of risk. Control measures must be imposed to ensure levels are not exceeded. Several ways of measuring health and environmental effects are discussed. Testing procedures for risk assessment are dealt with in great detail. Monitoring, interpreting data and risk assessment requirements of the Act are also discussed. The methodology and subject matter are of direct interest to AECB.

Rossi, P.H., H.E. Freeman and S.R. Wright. 1979. Evaluation : A Systematic Approach. Sage Publications, Beverly Hills.

A6, C4.2.1, D2.1, D2.4, D2.5, E1, E2

This is a comprehensive text allowing the reader to gain an understanding of the role of evaluation research in planning, design and implementation of both established and innovative social programs and projects. Contemporary technical procedures for target population selection, program monitoring and impact assessment are given, with detailed treatments of cost-benefit and cost-effectiveness techniques. The book is designed for policy and planning specialists (among others) in the social services field. Many case modules are given to illustrate different methods. Social service type programs do not seem directly relevant to AECB programs, but subjects such as evaluation of impacts of regulations and analysis of client satisfaction with agency performance are applicable to AECB regulatory programs. The book helps in defining questions and gives methods of answering them, while being realistic about the broader political influences on evaluations.

The uses of evaluation research are defined as, improving the collection, analysis and interpretation of information about the need for, implementation and impact of regulatory intervention. It discusses program requirements which are needed before an evaluation is possible. Four areas of questioning are looked into during research for program planning : (i) what is the nature and distribution of the specific problem to which the program is addressed ?; (ii) is the regulation delivered to the appropriate and specified target population ?; (iii) is the project directed at appropriate aspects of the specific problem ?; and (iv) is the intervention effort properly designed ? The procedures used to answer these question are called "process evaluation".

The need for monitoring program implementation is discussed in relation to accountability and as an adjunct to impact assessments. The questions asked here are whether the program is reaching the appropriate target population and whether delivery of service is consistent with program specifications. A framework is given for impact assessments, asking questions on whether intervention is producing the intended effects. Rigorous and approximate methods for impact assessment are given. There is a chapter on measuring efficiency, with guidelines for assessing costs, concepts and methodologies of ex ante and ex post evaluations, and cost-benefit and cost-effectiveness analyses. The final chapter puts evaluation research in the context of political realities, discussing, among other things, the interpretation of evaluation research and conflicts of concerned parties.

Royal Commission on the Ocean Ranger Marine Disaster. 1984. Report I : The Loss of the Submersible Drill Rig Ocean Ranger and the Crew. Report II : Safety Offshore Eastern Canada. St. John's, Newfoundland.

B3, C4.1.1, C4.2.2.2, D1, D2.2, D2.3, D2.6.4, D2.7

The Royal Commission attempted to discover why the Ocean Ranger capsized and sank with the loss of all crew, and how such disasters could be avoided in the future. There is much detail on how the Commission was set up, and the practice and procedure rules. Report I examines the loss of the Ocean Ranger against the marine-industrial background, the emerging regulatory system and evolving technology. It covers aspects of safety at sea and how the regulatory system functioned.

Report II analyses areas of continuing vulnerability and possible seeds of future disasters, including the regulatory regime. It gives conclusions and recommendations. The Commission followed the consultative process by instigating 24 studies which were reviewed by knowledgable persons, and by holding a seminar. Selected study reports and the seminar proceedings are included in this volume. One study analyses the offshore regulatory regimes in Norway, the United States, the United Kingdom and Canada. A study on Canadian regulatory management evaluates the management of the regulatory process in eastern Canadian offshore drilling, and does a task and skill analysis of agencies regulating eastern Canadian offshore drilling. A section of the seminar proceedings deals with the regulatory system. A paper by C. Bonke "A Control Regime and Structure for Effective Maintenance of Operational Safety" describes the present regulatory regime, gives an overview of concerns and problems industry has with the present regulatory practices and gives constructive suggestions to assist in improving the effectiveness and efficiency of the system.

These two volumes are particularly useful to AECB because of the issues they raise about safety regulation and the regulatory process, and the variety of methods used to evaluate regulatory programs.

Rutman, L. 1980. Planning Useful Evaluations. Beverly Hills, Sage Publications.

A4, A6, C2, C3.2, D2.1

The book is about evaluability assessment. The author has implemented evaluability assessments (EA's) across numerous government departments in Canada under the auspices of the Auditor General. The subject is introduced by a discussion on the need for EA's, which includes the definition of program evaluation, the different interests in it (legislative, budgetary, planning and management, and accountability and management), and growing disenchantment with it which can be addressed by an EA. Factors affecting evaluability are discussed - from program characteristics, to the purpose and feasibility of an evaluation, and various methods of approach.

Program analysis, or developing an evaluable model, is described in detail. This is the first stage in EA which identifies program components that are well defined and can be implemented in the prescribed manner, and clearly specified goals and effects that are plausible. When these are identified, it is necessary to determine which will be examined. The purposes and information needs of those who authorize or fund the evaluation are the major determinants of the focus and nature of the evaluation. The purpose of it establishes the methodological requirements. Feasibility analysis aims to determine the extent to which these requirements can be met - under all the constraints. Issues that can be considered when undertaking a feasibility analysis are discussed with the aim of providing guidance for such an analysis. Many programs will not be readily evaluable and a final chapter discusses how to enhance a program's evaluability.

This guide would be very useful to AECB evaluators as it decribes exactly how to go about assessing the evaluability of programs, according to the Treasry Board model. The context and examples are Canadian and Rutman offers more detailed discussion than Treasury Board Guides.

Rutman, L. and D. de Jong. 1976. Federal Level Evaluation. Carleton University Graphic Services, Ottawa.

A4, A6, C2

The paper discusses the growth of evaluation research in the Canadian Federal Government, particularly in the area of social programs. This increased interest is attributed to a need to ensure accountability, the public's criticism of programs and perception of insignificant effects, and the desire to rationalize government decision-making.

The paper outlines approaches and a framework for evaluation of government programs and makes suggestions on the future course of federal-level evaluations. It advocates that evaluations not be confined to stated goals and questions but should be free to raise issues outside the immediate needs of decision-makers. It also recommends that evaluability assessments be used more frequently before resources are spent on studies which may be doomed to failure.

The volume provides a concise summary of evaluation-related issues facing federal government departments. Although the work is now nearly 10 years old and its focus is on social programs with readily quantifiable parameters, the paper is a useful reference for basic design of an AECB evaluation program.

Sarant, P.C. 1978. Zero-Base Budgeting in the Public Sector: A Pragmatic Approach. Addison-Wesley Publishing Co.

D2.4

The book was written as a practical guide for U.S. government officials on implementation and application of Zero-Based Budgeting. Its examples are drawn from the U.S. federal government experience, and the various chapters of the book provide a step-by-step description of the development and implementation of the process. It is useful to AECB only as a general text; the paper by Knight (1979), reviewed in this bibliography, provides essentially the same information in the Canadian context.

Saskatchewan. 1984. Regulatory Reform Annual Report. Dept. of Energy and Mines.

B4.2,

This report describes how the Saskatchewan Department of Energy and Mines has implemented the Regulatory Reform Program. It lists the legislative and regulatory reform projects that have been completed or are in progress following the initiative and methods described below.

Saskatchewan. 1982. Guidelines for Regulatory Reform. Regulatory Reform Group, Executive Council.

C4.2.1, D2.2

A Regulatory Reform Group with a one year mandate was appointed from within the Executive Council. It was headed by a coordinator who reported directly to the Premier. The Group made recommendations to Cabinet to : repeal obsolete statutes; eliminate regulations which are unenforceable, obsolete, contradictory or duplicate; improve impact assessments for new regulations; improve private sector access to the regulatory process; find ways of reducing compliance costs; streamline timetables for regulatory compliance; promote selective deregulation where desirable; and, create alternatives to regulations.

Several programs were instituted under the Regulatory Reform Program. Program B deals with regulatory impact assessment (RIA). There are five guidelines concerning this. Each Department is given a regulatory impact assessment checklist of fundamental questions that it should consider to ensure full awareness of broad social and economic impacts of major proposed new Acts, regulations, regulatory policies and procedures. The Department is encouraged to provide a brief RIA in response to the questions. There are sixteen questions asked on the background and purpose, private sector impacts, public sector impacts, and alternatives and implications of the changes proposed. The questions asked would be of interest to AECB staff evaluating the regulatory program. Program C deals with regulatory repeal. Departments are asked to review existing Acts and regulations to identify those that are redundant, contradictory, antiquated or obsolete, and prepare a list for the Regulatory Reform Group. These questions are most relevant to AECB evaluators.

Sayle, A.J. 1981. Management Audits - The Assessment of Quality Management Systems. McGraw-Hill Book Co. (U.K.).Ltd.

A6, C4.1.2, D2.4,

This is a book about management audits (quality assurance audits) by an author experienced in performing management audits in the nuclear industry. Audit checklists have not been included as the author feels it is important for the auditor to compile his own, but all the information necessary to understand what is needed is in the book. Discussed in the book are : types of audit, such as internal, external and exstrinsic (the type performed by a regulatory body); the auditee's organization - which aims to help an auditor analyse the situation which will confront him during an audit; analysing each task in the organization to see what the auditor should examine; how to judge departmental quality assurance without auditing everything; how to compile checklists; audit preparation - briefing sessions etc.; how to go about the actual audit - questions, tactics and what to look for. It appears to be a very practical guide for this type of audit, and would be valuable to an AECB evaluator charged with performing a quality assurance audit.

Scarano, R.A. & J.J. Linehan. 1979. Current U.S. Nuclear Regulatory Commission Licensing and Review Process : Uranium Mill Tailings Management. In : J.G. Morse (ed.) Uranium Resource/Technology pp 326-343. Colorado School of Mines.

B4.2

This presentation is similar to many made by AECB staff describing AECB's regulatory processes. It therefore offers an opportunity for comparison of the method of description and regulatory approach. Its most interesting feature is that it describes in some detail, and recommends to licensees, four alternative designs for tailings retention that it says will meet regulatory requirements. Under prevailing Canadian regulatory practice this would be thought to be going too far in telling industry how to do its job.

Scarff, E. 1983. Evaluation of the Canadian Gun Control Legislation. Final Report. Programs Branch/Research Division. Solicitor General of Canada.

D1, D2.7

This is a three year study of the effectiveness of provisions of the Criminal Law Amendment Act of 1977, relating to firearms. Two types of analysis are performed. Outcome analysis examines the incidence of crimes and accidents before and after legislation, and process analysis examines the implementation of means of firearms control. Pre- and post-legislation data were compared, and trend analyses performed on post-legislation changes. The data were collected from federal, provincial and local sources, the RCMP, Statistics Canada, the Canadian Centre for Justice Statisics, Chief Provincial firearms officers, Provincial hunter safety coordinators and seven police forces. The author discusses the implementation and effect of legal provisions, screening and sentencing, search and seizure, safe handling and storage and regulation of business. This is of interest to AECB as it assesses the effectiveness of a regulatory Act and of enforcement programs.

Schrecker, T.F. 1984. Political Economy of Environmental Hazards. Protection of Life Series. Study Paper for the Law Reform Commission of Canada.

C2, C4.1.1

This paper on the political economy of environmental hazards begins with a brief critical overview of how policy on controlling environmental hazards is made in Canada. It argues that existing statutes and distributions of political resources provide advantages to the generators of environmental hazards rather than the recipients. Chapters 2 and 3 deal with how alternative policies are designed and presented by examining the two most important conceptual frameworks involved in assessing the tasks and objectives of environmental hazard policy. First, the ways in which scientific evidence is assessed and interpreted for the purpose of public policy making is discussed. The author argues that many important value judgements are left unexamined by the way scientific evidence is treated. Next he looks at economics. Chapter 4 examines the role of the large profit-oriented organization as a policy-making institution, postulating that it is as important in determining the level of environmental hazards to which Canadians are exposed as the governments charged with controlling such hazards. A concluding chapter outlines a few general observations which follow from the analysis of the preceding chapters. This is useful to AECB for identifying evaluation issues in its regulatory process.

Science Council of Canada. 1982. Regulating the Regulators : Science, Values and Decisions. Report # 35.

A5, C2, C4.1.1

Although this report is primarily concerned with problems created for regulators by new developments in biology, it includes pertinent analysis of regulatory processes and methods of resolving disputes. Of particular relevance are observations on the recruitment of regulators, the employment of scientific expertise in the regulatory process, the question of openness in regulation and the appropriate use, establishment, terms of reference and practice of commissions of enquiry. The report will be useful to AECB evaluators defining questions in those areas.

Science Council of Canada. 1977. Policies and Poisons : The Containment of Long-Term Hazards to Human Health in the Environment and in the Workplace. Report # 28.

D2.6.2

The toxic hazards dealt with in this report include radiation. The report reviews methods of risk assessment and emphasizes the need to ensure objectivity in the regulatory process. It will be very useful to those establishing evaluation criteria in scientific and technical aspects of AECB regulation. The report also makes recommendations about intergovernmental, interdepartmental and institutional arrangements. These too are relevant to evaluations dealing with those aspects of regulatory processes.

Schultz, R., F. Swedlove and K. Swinton. 1980. The Cabinet as a regulatory body : the Case of The Foreign Investment Review Act. Economic Council of Canada Working Paper #6.

C4.1.3

This paper is relevant to the early stages of designing evaluations when the authority, power to act and responsibility (mandate) of the given agency must be made clear. It deals with questions of where decisions are actually made and where responsibility resides. Accountability is not often addressed so directly. The paper is of particular relevance to evaluation of the independent regulatory agencies including AECB.

Scott A. and P.A. Neher (Eds.) 1981. The Public Regulation of Commercial Fisheries in Canada. Economic Council of Canada.

B4.2, C4.1.1, C4.2.1, D1, D2.5

The paper describes the historical development and present status of fisheries regulation in Canada, and evaluates and questions the environmental, social and economic objectives and goals of the program. It provides a discussion of the philosophy of regulation in the public interest. The evaluation focusses on the economic impact of regulation on the industry, assesses the degree to which regulation achieves its objectives, and examines the secondary effects of regulation on the industry in terms of economic decision-making, compliance, and effort expended on evasion of regulation.

This paper is supported by four case studies in the Technical Report Series, also published by the Economic Council Canada (Nos. 16-19 incl.). These reports deal with specific industries (e.g. the Maritime lobster fishery and the Pacific salmon fishery) and form the technical basis for the discussion and conclusions drawn in the summary paper.

The regulatory programs of the fisheries industry and AECB are not directly analogous, but both have aspects of environmental impact control and a diversified range of regulatory responsibilities. The paper is an example of the evaluation of economic impact of regulation using standard methods of scientific inquiry, and an example of an integrated evaluation of all aspects of a regulatory program from first principles.

SECOR Inc. 1984. An Assessment of the AECB Consultation Process. A report prepared for AECB, Ottawa.

B4.2, D2.1

The report analyses the consultation process followed by AECB in discharging its responsibility for regulation development. It examines targeting of the consultation towards groups that could be expected to provide valuable input. Target groups are identified and types of methods used to reach these groups are discussed. An analysis of the AECB's mailing list is given. The study looks at how effective is the consultation process and at procedural improvements that might facilitate the preparation of comments by outside groups. It discusses how to improve the understanding among the public of the role of AECB, and of issues concerning the siting and operation of nuclear facilities and the use and handling of prescribed substances. Evidence is obtained from the perceptions of the outside participants in the consultation process and by comparative evaluation of procedures followed by other federal regulatory agencies. An interview guide is given. Recommendations to AECB for improving the targeting and effectiveness of the consultation process are set out.

SECOR Inc. 1980. Estimating the Costs of AECB Regulation. A Report Prepared for the AECB, Ottawa.

B4.2, C4.2.1, D2.4

This is a study of the feasibility of determining the costs imposed by AECB's regulatory activities. It provides a conceptual and methodological framework for an actual cost study of existing AECB requirements. A background is given on nuclear regulation and cost analysis, obtained from interviews and a literature search. The authors examined trends in regulation, public and government attitudes towards regulation, socio-economic impact analysis, AECB regulation and cost studies in Canada and the United States. They concluded that a cost study was possible.

The objectives of the cost study are : (i) the identification of costs of health and safety measures; (ii) allocation of these costs to "prudent operation" or to AECB regulation; (iii) identification of areas of contention with respect to these allocations, and the magnitude of health and safety costs identified; and (iv) provision of an analytical tool which could be used for an eventual SEIA to be performed by the AECB. Industrial activities of medium and low technical complexity (such as mining) and those of high technical complexity (such as reactors) were analysed separately. General methodology is given for making cost estimates. The high technical areas are more complicated. In their case, costs have to be broken down by means of the different components and stages of the operating process.

Shrader-Frechette, K.S. 1980. Nuclear Power and Public Policy - The Social and Ethical Problems of Fission Technology. D. Reidel Publishing Co.

C3.1

The book examines briefly the rise of nuclear technology since the Second World War and the role of the U.S. federal government in regulation and the setting of standards. The greater part of the book discusses the ethical and social issues surrounding peaceful uses of nuclear technology. These issues include exposure to low level radiation, nuclear waste storage and disposal, core melt-down, the problem of externalities in the nuclear-economic system, and general questions of nuclear safety. The author raises and emphasizes the ethical and moral questions which are associated with these issues and the implications of incorrect or misguided assumptions about the safety and economics of nuclear energy. The book presents a scientifically and economically based discussion of many pressing ethical questions raised by the public and the anti-nuclear lobby. These are worthy of consideration when identifying evaluation issues for nuclear regulatory programs such as AECB's.

Sims, G.H.E. 1980. A History of the Atomic Energy Control Board. AECB. Can. Govt. Publ. Centre.

B4.2, D1

This is a history of the AECB, commissioned by the AECB and using information gathered from the Board's files, documents and staff. It describes the regulatory situation in Canada before the existence of the Board and the need that led to the creation of the AECB. The Board's creation, its early operations and subsequent evolution are described in detail. AECB is discussed in relation to atomic energy research and regulation of the uranium industry, the nuclear power industry, radioisotopes and transportation industries. Some specific regulatory problems, especially in the health and safety area, and AECB's treatment of them are described. AECB and its role in international affairs is dealt with in an historical context. The final chapter summarizes some of the current problems facing AECB, focussing on legislation, and puts forth a proposal to reform the legislation that defines the powers and mandates of AECB. Knowing how the present structure of the AECB has evolved helps an evaluator to understand its mode of operation and to define appropriate evaluation questions.

Slatter, F.F. 1982. Parliament and Administrative Agencies. Administrative Law Series Study Paper. Law Reform Commission of Canada.

B4.2, C4.1.3, D1, D2.1

This study is one of the series of Law Reform Commission reports on administrative agencies in Canada. It examines the relationship between these quasi-independent agencies and Parliament. The paper attempts to determine where the balance between their independence from, and accountability to, elected officials lies, and how this affects the determination and evaluation of the work of the agencies. It describes the many roles independent agencies play in the Canadian system, the role of Parliament in relation to these agencies, and the points of interaction between the two. The summary makes wide-ranging recommendations on all aspects of the work of administrative agencies from their legislative mandate to public participation. It particularly stresses the need to involve Parliament directly in the creation and scrutiny of these bodies.

The report was based on interviews with MP's, agency staff, and public servants. The paper is important in designing a first principles evaluation and in examining the degree of autonomy and responsibility accorded an agency such as AECB and the extent of political influence exerted on its decisions.

Smith, W.J. 1982. Evaluation Assessment Report on Water Resources Management. N. Affairs Program, DIAND.

B4.2, C3.2, C4.2.1

This is an assessment to determine the extent to which the water management component of the Northern Affairs Program is susceptible to evaluation, and to define the appropriate focus of the evaluation study. It includes a description of the program, identification and discussion of evaluation issues and related evaluation approaches, and the design of specific evaluation options. It is a typical assessment for an evaluation of the type required by Treasury Board, and as such, it is of interest to AECB, but is not the most instructive example.

Three options are identified. The first is an effectiveness evaluation study as described in the Treasury Board (1981b) "Principles for the Evaluation of Programs by Federal Departments and Agencies". This would : describe and measure the extent to which stated objectives were achieved as a result of the component's activities; review and analyse mandate and rationale issues; and recommend, where suitable, cost-effective alternatives. The second option is a program design and delivery study. This would include evaluation of the extent to which actual program delivery processes have affected program intervention. This would be accomplished by : analysing, where suitable, the component's internal transfer processes, including key management groups' roles, reponsibilities, criteria and policies; and by determining the compatibility of specific management groups' policies and goals with stated component objectives. The third option is a combination of the first two. Methodologies recommended are documentary research, personal interviews, field observation, limited case studies, cost-effectiveness analysis and trend analysis. Effectiveness indicators are proposed.

Stanbury, W.T. (Ed.). 1980. Government Regulation : Scope, Growth and Progress. Montreal : Institute for Research on Public Policy.

B3, C3.1, C4.2.1, D2.2, D2.4, D2.5

This is an often-quoted collection of papers on the government regulatory process in Canada and the U.S. In the lead article Priest, Stanbury and Thompson discuss the definition of economic regulation and its role as an instrument of government. Stanbury and Thompson then compare the extent of regulation in the U.S. and Canada and conclude that many of the differences assumed to exist in coverage, intensity of regulation etc. are only perceived and have no basis in fact. Priest and Wohl examine the growth of federal and provincial regulatory activity from 1867-1978. Anderson looks at the process of regulation-making by Governor-in-Council and regulatory reform. Thompson's article on regulatory reform and deregulation in the U.S. examines the review and evaluation tools the U.S. government has employed in recent years - including economic impact analysis, cost-benefit analysis, and zero-base budgeting. Thompson's closing paper looks at the acknowledged problems of inefficient regulation and the methods of economic analysis, and particularly cost-benefit analysis, proposed as means to improve the regulatory decision-making process.

These papers are regarded as milestones and provide important analyses of the economic aspects of regulation, its costs and impacts. They are of use in the overall design of an AECB evaluation of the impacts of regulation on the nuclear industry.

Stanbury, W.T. (Ed.) 1978. Studies in Regulation in Canada. The Institute for Research on Public Policy.

C3.1, C4.2.1, D2.2, D2.4

This collection of papers deals with regulation and regulated industries in Canada. Reschenthaler surveys the policies and problems associated with direct regulation in Canada and discusses independent agencies (such as NEB, AECB) as one instrument of direct regulation. Problems discussed include: capture by the regulated industry, inadequate staff and resources for regulators, lack of consumer or public input to the regulatory process, emphasis on adjudication and protection of the regulated industry, restricted rate of technological change, and too little emphasis on operating efficiency. He also discusses the major differences between the Canadian and U.S. systems of regulation. He advocates the preparation each year of a regulatory impact statement which would evaluate the performance of regulatory agencies against stated objectives and goals, and would reflect clearly the costs and benefits of the various programs. He acknowledges that the difficulty in doing this lies in devising appropriate cost-benefit measures for the work of regulatory agencies.

Helliwell undertakes an economic analysis of regulation with emphasis on, and examples drawn from the Canadian public utility companies. He discusses several issues facing Canadian regulators : quality of service, social costs and consistency across jurisdictions. He concludes by raising several questions about the evaluation of regulation in Canada such as "Who regulates the regulators ?"

The other three papers in the volume deal with regulation in the transportation industry. Borins looks at government ownership as an alternative to government regulation or private ownership in the case of the Canadian Air Transport Administration (CATA). CATA owns and operates all major airports in Canada.

Maister looks at technological change in a regulated environment - the Canadian grain transport industry - and concludes that modernization of the antiquated collection and transportation system has been inhibited by regulatory barriers. He examines the mechanics of the political and organizational shifts that have recently brought about change.

Lastly, McManus examines the National Transportation Act in the light of the problem of cross-subsidization.

This volume discusses many important issues in the Canadian regulatory system. It arose at a time when interest was mounting for evaluation or scrutiny of regulatory agencies in Canada, led by the ECC and the Institute for Research on Public Policy, and it exemplifies evaluation of the various industries using the standard methods of intellectual inquiry, description, and analysis. Many papers point to the problems of quantification of costs and benefits which face AECB in designing its own evaluation program.

Stanbury, W.T., and F. Thompson. 1982. Regulatory Reform in Canada. Montreal, Institute for Research on Public Policy.

B3, C2, C3.1, E1

This paper reviews the large body of recent Canadian studies of regulation and reviews proposals for "deregulation". It provides summaries of the issues discussed by the major contributors and of their recommendations. Included are the work of the Economic Council of Canada, the Institute for Research on Public Policy, the Law Reform Commission, the Lambert Commission, the Peterson Committee, the Ontario Economic Council and the Government of Ontario. The tasks of the Federal Office of the Coordinator of Regulatory Reform are also discussed, as are many individual papers not published under the aegis of the above organizations. The reviews in this paper are very useful in defining criteria for evaluation of existing regulatory programs and for examining alternative methods of achieving the same objectives.

Steiss, A.W. 1982. Management Control in Government. Lexington Books.

A3, C4.1.2, D2.3, D2.4, E1

Steiss examines management control, focussing on the potential for applying the techniques used in business and industry to the activities of government agencies and public organizations. His is a comprehensive book, useful for an AECB evaluation in all areas of management control and financial accountability. It begins by defining management control and outlining the limits of what it can achieve. Traditional mechanisms of management control provided through financial accounting are explored, with modifications for their application to the public sector. The bases for accounting are discussed to illustrate the bridge between financial accounting and managerial accounting. A chapter on managerial-cost accounting focusses on cost determination and cost control. The specific techniques of cost accounting and responsibility accounting for supporting these functions is described. Cost considerations are discussed in relation to cost-benefit and cost-effectiveness analyses.

How to achieve timely and pertinent management information systems is next examined. The chapter on productivity improvement in the public sector discusses improvement options, how to measure productivity, measurement systems, elements of a productivity improvement program and improvement in input labour quality. A chapter on performance evaluation identifies different types of evaluation, discusses planning for better evaluations, gives basic approaches to evaluation and examines the application of evaluation findings. There is a discussion of the effects of the attitudes of management on a management control system. Budgeting, planning and auditing as a means of management control are all dealt with extensively. The final chapter deals with the implementation of a management control system.

Methods described in this book are applicable to evaluation of the efficiency and financial management of government programs, including those of AECB.

Stevenson, J.D. & F.A. Thomas. 1983. Selected Review and Evaluation of U.S. Safety Research vis-a-vis Foreign Safety Research for Nuclear Power Plants. 1982a. Selected Review of Foreign Licensing Practices for Nuclear Power plants. 1982b. Selected Review of Foreign Safety Research for Nuclear Power Plants. Stevenson & Assoc. for USNRC. NUREG/CR-3212.

B4.2, D1, D2.7

These reports identify areas of current nuclear safety research at laboratories and other institutions throughout the United States and in several other countries, and also review foreign licensing practices for nuclear power plants. They are basically information reports and do not evaluate in any depth.

Stewart, D.W. and G.D. Garson. 1983. Organizational Behaviour and Public Management. Marcel Dekker Inc.

C4.1.2, D2.3, E2

Organizational behaviour is a field of study which focusses on the behaviour, attitudes and performances of people within an organization, and public management is the organization and direction of resources to achieve a desired result in the public or governmental sector. This book is about the intersection of organizational behaviour and public management studies. A study of organizational behaviour from a public management perspective is useful to evaluators as it helps them to analyse cause and effect relationships in organizations and will raise questions about how human interaction should proceed in an organization. A manager with an understanding of the subject could improve the performance and efficiency of the organization.

The book notes that the public setting in the United States creates a different context for management in a number of areas. Four important differences are : the short time horizon for implementing programs due to the election cycle; having no agreement on standards and measurements of performance - the private sector's bottom line of profit has no counterpart in the public sector; personnel constraints caused by two layers of management, the civil service and political appointees, which frustrates the capacity to control; and the public "right to know" which gives the media access to management decision-making.

The book moves from a study of the individual, to the group and then to the whole organization, and at the same time moves from isolated instances of applied theoretical concerns to organizational challenges stimulating concerted management response. The first three chapters draw on the literature of motivation theory, role theory and leadership theory to show how individual predispositions and situational characteristics join to produce particular attitudes and behaviours of people at work. Three aspects of group interaction central to organizational performance are analysed next. These are communication, decision-making and participation. The organization and its capacity for change is discussed next.

The final four chapters explore applied management problems by drawing on actual examples of how individuals and groups function and how organizations change. These chapters provide an opportunity for integrated analysis of all dimensions of organizational behaviour. Four specific management challenges are examined : performance appraisal, management information systems, management ethics, and equal employment opportunities. The first three are of interest to AECB evaluators analysing program design and efficiency.

Stockholm International Peace Research Institute. 1979. Nuclear Energy and Nuclear Weapon Proliferation. Taylor and Francis, London.

C3.1, D2.7

This volume consists of many contributed papers which discuss the technical problems that must be solved in controlling nuclear proliferation. It would provide a useful checklist for technical evaluations of control programs such as that of AECB. The papers review alternative control methods, providing a comparative base for such evaluations. The report also includes a brief evaluation of the International Fuel Cycle Evaluation Program and a discussion of its shortcomings.

Sviridov, F.A. (Ed.) 1981. The Role of Patent Information in the Transfer of Technology. Proceedings of International Conference, Varna, Bulgaria, May 27-30, 1980. World International Property Organization. Pergamon Press.

C4.2.2.2, D2.6.4

These are the proceedings of a symposium assessing the importance of patent information for the development of industry, science and the economy. Included are papers on the role of the patent office in the Australian Government Industry and Research Institution, the use of patent information for technical assessment, and patent information services in the United Kingdom. This report provides technical information that would be useful in the design and conduct of an evaluation of AECB's responsibilities for Canadian patents.

Swartzman, D., R.A. Liroff and K.G. Croke (Eds.). 1982. Cost-Benefit Analysis and Environmental Regulations : Politics, Ethics and Methods. The Conservation Foundation, Washington.

D2.4

The book is a collection of papers presented at a 1980 conference on the polictical and ethical ramifications of the use of cost-benefit analysis (CBA) in environmental regulation. The papers represent both sides of the CBA argument - those who are wary of the assumptions inherent in quantification and feel CBA is unsuitable for environmental decision-making, and those who place great faith in CBA and its related formal decision protocols.

Liroff in his overview paper summarizes the strengths and limits of CBA, and makes recommendations on its use. Part II of the volume describes recent state programs in Illinois where legislation requires that an economic impact statement be prepared on all regulatory pollution control related proposals. Part III discusses the sources of controversy over environmental applications of CBA in the areas of methodology, politics, and ethics. The chapter on politics by Andrews examines CBA as a tool for U.S. federal regulatory reform.

The volume presents a valuable analysis of CBA as an evaluative tool in an area of regulation pertinent to the AECB mandate. The discussion of current experiences and lessons learned from past applications, and the extensive discussion of some of the more difficult problems associated with quantification and valuation of benefits are particularly useful.

Thierauf, R.J. 1980. Management Auditing - A Questionnaire Approach. American Management Assoc.

A6, C4.1.2, D1, D2.3, D2.4

This is a book about management auditing - appraising the ability of managers to accomplish specific objectives and assigned tasks. The book relates management auditing to other audits currently employed by organizations, and also presents a complete management auditing questionnaire for evaluating the functional areas of a typical organization from a management viewpoint. Separate sections of the questionnaire deal with corporate planning, accounting, finance, marketing (including physical distribution), research and development, engineering, manufacturing (including inventory and purchasing) and personnel. There are also sections in the questionnaire concerning an organization's work environment and its information system. The structure of the questionnaire for each section consists of long-range plans, short- and medium-range plans, organization structure, leadership, communications and control. From those perspectives managerial efficiency or inefficiency can be pinpointed. If unfavourable conditions exist the questionnaire will highlight them and provide a starting point for improving organizational effectiveness.

This book would be useful to AECB evaluators for assessing management effectiveness in accomplishing organizational objectives.

Treasury Board of Canada. 1985. Evaluating Regulatory Programs. Draft Discussion Paper. Program Evaluation Branch.

A4, A6, C3.1, C3.2, C4.2.1, D1

The report begins by defining regulation and dividing it into two categories : Health, Safety and Fairness; and Economic Regulation. The authors recognize 21 regulatory instruments, most of which are grouped under market control or standard-setting and enforcement. These correspond closely with program activities identified in most Canadian public service evaluations. "Logic diagrams", a variety of systems model, are endorsed as a tool for program description and identification of evaluation questions or issues. A list of basic issues for evaluation is presented. The issues cover program rationale and impacts, and the examination of alternative means of achieving regulatory goals.

The treatment of methods of answering questions is less satisfactory. Thirteen methods are recognized : statistical/econometric/mathematical modelling, benefit-cost analysis, cost-effectiveness analysis, micro-economic analysis, quantification of the extent of use of, or output from, the activity, user interviews and surveys, peer reviews, expert opinion, case studies, comparisons with other programs/ countries, conceptual analysis, natural observation by evaluator and review process or operational audit. Methods appropriate to each of the 21 regulatory activities are tabulated. Their strengths and weaknesses are briefly noted and they are treated more as alternatives than as potentially complementary. There is no discussion of the particular problems encountered in applying them to regulatory programs.

In spite of these reservations, this report is essential reading for those considering evaluation of Canadian regulatory programs. The report defines the Public Service perspective and context for such evaluations and this will obviously influence the choice of method.

Treasury Board of Canada. 1984. Evaluation of Research and Experimental Development Programs. Branch Discussion Paper. Program Evaluation Branch.

A5, A6, D1

This discussion paper was written to assist evaluators evaluate federal government R & D programs. It is in line with the Office of the Comptroller General philosophy on program evaluation, and is offered as a guide in responding to a call to evaluate. It discusses program evaluation in the context of the "Guide on the Program Evaluation Function". Evaluation issues in R & D programs are discussed at length to help the evaluator define evaluation and indicator questions, decide on appropriate methods for obtaining information and decide which issues are most important. The discussion on program rationale issues leads to an approach which can provide assurance that the program does make sense with government. The main alternatives issue dealt with in the report is whether research should be in-house or contracted out. Questions on impact and effects are thought to be best answered by client survey or a panel of experts. Various ways of measuring R & D quality are reviewed to assist in evaluating objectives achievement. Selected evaluation approaches are given which the authors hope should offer enough scope to carry out a useful evaluation.

Treasury Board of Canada. 1981a. Guide on the Program Evaluation Function. Program Evaluation Branch. DSS.

A1.1, A1.2, A3, A4, A5, A6, B3, C4.2.1, E1, E2

The guide begins by setting out Treasury Board policy on program evaluation. Basic Program Evaluation Issues are defined as Program Rationale, Impacts and Effects, Achievement of Objectives and Alternatives. Two important features of the policy that shape the recommended approach to evaluation are that the commissioner of evaluation is the Deputy Head (a public servant), and that subprograms of a given Department or Agency program are expected to be evaluated separately.

The guide is much concerned with the place of evaluation in overall public service management and in the organization of Departments or Agencies. The chapter dealing with methods of evaluation is relatively brief, but it does distinguish two stages in evaluation : evaluation assessment and actual evaluation. The Office of the Comptroller General is identified as a source of advice and assistance in the planning and conduct of evaluation.

AECB evaluators must follow the pattern established by this document.

Treasury Board of Canada. 1981b. Principles for the Evaluation of Programs by Federal Departments and Agencies. Program Evaluation Branch. DSS.

A4, A6, C2, C4.2.1, D1, E1, E2

This is a companion volume to the Guide referred to above and provides more detail about methods of conducting evaluations. It deals with program definition and description, identification of evaluation questions and issues and identification of evaluation criteria under "evaluation assessment". Under "evaluation study" the booklet sets out some general principles for the gathering of information from written documents and interviews. In general, the authors focus on what evaluation methods must achieve rather than how they can achieve it. This is not of great help to an evaluator. Because the methods used in an evaluation are likely to be specific to at least the type of program being evaluated, this weakness is hardly surprising. There is no specific treatment of regulatory programs, but AECB evaluators will find the report useful in providing a little more detail about Treasury Board wishes than the Guide referred to above.

Trebilcock, M.J., R.S. Prichard, D.G. Hartle and D.N. Dewees. 1982. The Choice of Governing Instrument. A Study Prepared for the Economic Council of Canada.

B4.2, C4.1.3

This report studies the nature of the constraints under which policy makers choose their instruments for governing, and the factors which determine the degree of suitability among instruments.

It examines alternative explanations of state intervention in the economy, to help in the choice of instrument. The perspectives of the principal actors, from politicians to interest groups and media, are discussed. The authors evaluate the thesis that instruments should be chosen on the grounds of technical efficiency. Institutional characteristics of some of the major classes of instruments are described to assist in the choice of instrument. The use of various instruments is discussed in the context of studies of public concerns and perceptions, and the demand for regulatory reform.

The topics covered in this report would apply to evaluation of any regulatory body, including AECB. It would be useful when examining the best form that regulation should take to achieve the desired results. In Treasury Board terms, this is the "program alternatives" part of evaluation.

Tupper, A. and G.B. Doern. 1981. Public Corporations and Public Policy in Canada. Institute for Research on Public Policy. Montreal

C4.1.3

The book provides a critical appraisal of the changing role of public corporations in Canada in relation to public policy, performance , and government policy. It examines the rise of crown corporations in areas previously the domain of private enterprise and discusses the problems faced by these industries as they compete in the general economy. The volume is a collection of case studies of various corporations, among them AECL, Petro-Canada, Air Canada, Asbestos Corporation of Quebec, and Cape Breton Development Corporation.

Tupper and Doern provide an initial overview chapter which sets the focus for the case studies and asks questions about the real and perceived role of the crown corporation in the government system, about interaction and accountability in relation to the federal government, and about the growing conflict of interest problems facing crown corporations in competition with other industries. Evaluation of the role and achievements of the various corporations is accomplished through a standard approach to inquiry, along the lines of the LRC studies. The papers provide a useful background to understanding crown corporations as an instrument of government policy and by extension the role of regulators in the system.

The extensive chapter on AECL by Doern outlines the changes in AECL's mandate since World War II and provides a useful perspective on the consequent changing role of AECB. An understanding of Crown Corporations is useful to evaluators of AECB regulatory programs because of the prominent role of such corporations among those regulated by AECB.

United Kingdom. Royal Commission on Environmental Pollution. 1976. Chairman Sir Brian Flowers. Sixth Report. Nuclear Power and the Environment. London, Her Majesty's Stationery Office.

C3.1, C4.2.2.1, D2.2, D2.6.3

This is the sixth report of the Royal Commission on Environmental Pollution. It deals with nuclear power and the environment and is relevant to AECB for identification of technical and political evaluation issues. Evidence was obtained from many organizations, both government and otherwise, as well as from private individuals in conducting what is essentially an evaluation of the U.K.'s nuclear policies and programs.

A factual foundation for the study is given first by a simplified account of radioactivity and its effects, the principles of nuclear power and the nuclear fuel cycle. Issues of nuclear development causing most anxiety are considered. The national and international organizations responsible for the control of radioactivity and nuclear power are described and conclusions and recommendations for changes in these arrangements are given. The principles involved in appraising reactor safety and how they should be implemented are discussed, as well as the policy on reactor siting. The security arrangements which are required in relation to nuclear power are covered briefly. The management of radioactive wastes is covered fully, describing what is being done and what the Commission would like to see being done. Current energy consumption and future projections of consumption are considered in the light of environmental consequences. The Commission's views on the development of nuclear power in Britain are given, and conclusions and recommendations are summarized.

United Kingdom. Royal Commission on Environmental Pollution. 1972. Chairman Sir Eric Ashby. Second Report. Three Issues in Industrial Pollution. London, Her Majesty's Stationery Office.

C3.1, C4.2.2.1, D2.2

This is the second report of a commission appointed to advise on matters, both national and international, concerning the pollution of the environment; on the adequacy of research in this field; and the future possibilities of danger to the environment. This report discusses and gives the Commission's opinions and recommendations on issues which arose during its study of the amounts of pollution, and steps being taken to abate it, in estuaries where there has been industrial development. The issues are : "Should information about industrial effluents and wastes remain secret ?"; "Should we try to get some voluntary "early warning system" for the possible impact on the environment of new chemicals both in their production and use, as is the case with drugs and pesticides ?"; and "Should there not be some regulation to control the tipping of potentially dangerous materials on land ?" The issues raised by the Commission are relevant to AECB's regulations that relate to environmental protection.

United States Advisory Committee on Intergovernmental Relations. 1980. Citizen Participation in the American Federal System. Washington, D.C.

B3, C4.1.3, D1, D2.1

This report is a comprehensive and extremely valuable guide to the subject of public participation in regulatory processes. It is essential reading to an evaluator of public participation in the regulatory process of AECB or any similar agency. It defines and describes, with examples, alternative approaches to public participation. It then defines evaluation questions and evaluation criteria based on the objectives and methods of the various approaches. Methods of answering questions are standard interviews and document review techniques. The report also reviews the few well documented evaluations of public participation that were available in 1980, and emphasizes the need for more such studies.

United States Atomic Energy Commission. 1971. Proceedings, Third International Symposium - Packaging and Transportation of Radioactive Materials. 2 Vols. CONF-710801.

D2.6.3

These two volumes are a collection of technical papers dealing with all aspects of the transportation of radioactive materials and waste products in the U.S. and abroad. They provide a useful background reference for an evaluation of technical regulations in this area.

United States Council on Environmental Quality. 1972. The Economic Impact of Pollution Control: A Summary of Recent Studies. Department of Commerce and the Environmental Protection Agency.

D2.5

The volume contains summaries of contractors reports on the economic impact of pollution abatement requirements on 11 specific industries and on the general economy. These reports deal largely with adverse economic impacts on employment, sales, profits, etc. associated with increased costs to the industry. The 11 industry-specific reports are microeconomically based while the more general study uses an econometric model. The studies are based on data available at the time (1972) and cost estimates are projected to 1980. Industries examined include automobile, steel-making, electric power generation and petroleum refining.

The methodology for determining the additional costs associated with pollution control is standard within the economic discipline. Some of these studies could perhaps provide an example of implementation of the methodology. The content is however dated and other applications quoted in this bibliography are more relevant to AECB.

United States Department of Energy. 1982. Department of Energy Organization Act : Title X : Sunset Review. Report to the Congress. 2 Volumes and Summary Volume. Office of Policy, Planning and Analysis. DOE. Washington DC.

C4.1.2, C4.2.1, D1, D2.4

The Department of Energy was created to formulate and implement a national energy policy to deal with short- mid- and long-term energy problems of the Nation, and to develop plans and programs for dealing with domestic energy production and shortages. A sunset review clause was included in the DOE Organization Act to assess whether DOE had fulfilled its mandate, and how to reorganize its various parts into other organizations once it had fulfilled its mandate. This report fulfils the provisions of the sunset clause in the Act.

There are 14 analysis points required by the Act. Five are critical to the design of the review. Three are retrospective and require the identification of the historical goals and objectives of the Department's programs, an assessment of the degree to which these were achieved and a statement of the program's accomplishments. Two points are prospective, identifying current needs and objectives for the programs, and assessment of resources needed to achieve them. The activities of the Department were broken down into a series of program analysis units (PAU's) to provide some reasonable order for the congressional review. The review process had three phases. The first identified a set of clear and concise and measurable objectives for each PAU, and a set of effectiveness measures for each objective. The second consisted of developing the 14 point analysis for each PAU. The third was the review and compilation of the second phase analyses into a final study and summary volume.

The "Summary Review" discusses the evolving energy policy context; describes the five types of program administered by DOE, discussing what each is, what it has achieved, and its future direction. There are two other volumes. These present a "Program-by-Program Analysis" which supplies more detailed program information and evaluation of the Department's activities.

This is a very thorough analysis of a whole Department regulating many of the same areas as AECB. The methods of program analysis, framing of questions and actual evaluation are all of considerable relevance and interest.

United States Executive Office of the President : Office of Management and Budget. 1985. Regulatory Program of the United States Government. April 1st, 1985 - March 31st, 1986.

A5, B4.2, C2, D2.2, E2

The purpose of this volume is to make the regulatory goals of the United States Administration understood, and to further their realization. The goals include coordinating government regulations and reducing duplication and conflict, establishing priorities, increasing the accountability of agency heads, providing for oversight of regulation by elected representatives and specifically the President and reducing the burden of existing and future regulation. One of the principal objectives of the publication of the volume is to facilitate the review and evaluation of regulatory proposals by the public and its elected representatives.

In the introduction, a brief overview of the entire United States regulatory program is undertaken. Regulation is classified by function into three types : protective of health, safety and environment, regulation of market and economic relationships, and management of federal funds and resources. Objectives and priorities in these areas are summarized. The main body of the text consists of detailed descriptions of each federal regulatory program. In addition, regulatory actions planned for the current year are classified by program activity and described under four headings : problems to be solved, need for federal solution, approach and next steps. This kind of analytical description will be very useful to program evaluators within and outside the United States Government.

United States General Accounting Office. 1984. Report to the Chairman, Federal Energy Regulatory Commission. FERC Can Improve its Operational Performance by Broadening and Deepening Current Management Efforts. GAO/AFMD-84-8.

C4.1.2, D2.3, E2

This review assesses how well FERC manages its operational performance by developing and analysing quantitative measures of operational performance and assessing strategies used by FERC managers to meet operational goals. It also identifies opportunities for improvement.

Three factors are measured to assess operational performance. These are : timeliness, such as the time taken between receipt of an application for a licence and granting of formal approval; productivity, which is measured by giving tasks set weightings, totalling these and dividing the figure by the resources available to do the task; and quality, which could not be evaluated as the necessary data such as error rates, appropriate application of rules and treatment of applicants were not available. Opportunities for improvement were identified by comparing different year's figures and examining areas where there had been no improvement. Management interviews and discussions, both inside and outside the agency, helped detect and define problems. The report lists the questions that were asked in the interviews. Detailed auditing and analyses were performed to identify potential benefits and to screen out opportunities that had little pay off, were not realistic for the agency to handle or were already being attempted. Management strategies for improvement were assessed by a survey of top executives who were asked to give examples. Proposals for improving productivity are presented. The report would be very relevant to AECB in the review of such areas as licensing procedures, where there is a definite task to measure.

United States Inter Agency Review Group on Nuclear Waste. 1979. Report to the President. U.S Government Publications.

B4.2, C3.1, C4.2.2.1, D2.1, D2.6.3

In 1978 the Directorate of Energy Research in the U.S. Department of Energy prepared a draft review of Nuclear Waste Management Programs in the U.S. The Inter Agency Review Group solicited public and industry comment on this draft report, incorporated the results into a second amended report and made recommendations to the President. This second report is of particular interest as an example of the effective incorporation of public input into a review or evaluation. The subject matter is also of relevance to AECB in that issues of public health and safety that arose in this review are identical to those that arise in review of radioactive waste management in Canada.

The report discusses national goals, planning objectives, criteria and procedures for nuclear waste management as a guide to policy, regulatory, and research and development programs. There is a discussion of technical issues associated with nuclear waste management and recommendations for key elements in a preliminary plan for developing near-term programs. A section on institutional issues covers cooperation with State and Local Governments, overall planning, siting activities, NEPA and regulatory review, public participation, issues related to spent fuel and low level waste, U.S. involvement in international waste management efforts and transportation issues. There is a discussion of management considerations such as organizational issues, costs and financing, legislative requirements and recommendations for follow-on implementation. Work plans are given for each major type of waste, based on government decisions and interim strategic planning bases.

United States National Industrial Pollution Control Council. 1971. Mathematical Models for Air Pollution Control Policy Decision Making. Sub-council Report.

D2.4, D2.6.2

This report was prepared for the U.S. Council on Environmental Quality to assess the state of development and use of cost-effectiveness and cost-benefit analysis for air pollution control policy decision-making. It notes a few problems impeding broader use of the techniques and gives recommendations to improve their effectiveness and promote their use. The methods are applicable to AECB evaluations.

United States National Research Council 1977. Decision Making in the Environmental Protection Agency. Vol. II. Commission on Natural Resources, Report to the USEPA. National Academy of Sciences. Washington.

B4.2, C4.1.1, D1, D2.3, D2.4, D2.6.1

This report presents an actual evaluation of decision-making procedures at the EPA. The authors examined case studies of past decisions and commissioned special reports on subjects of interest. No evaluation was made of the substance of regulatory decisions. The focus of attention was the extent of use of technical and scientific information in the decision-making process and whether this was sufficient to assure that well-informed decisions were made.

The report examines the development of standards as the framework for the decision-making process, as well as the actual procedures for reaching a decision. It identifies problem areas - the need for review by outside experts, the dependence of the regulatory agency on data and initial analyses from the regulated industries, and the general paucity of research in support of decision-making - all of which are analagous to problems faced by AECB.

The report's appendices provide a full description of EPA's programs and procedures and discuss quantitative evaluative methods such as cost-benefit, cost-effectiveness, and decision analysis. This report is a major reference for the design of regulatory procedural evaluations.

United States Nuclear Regulatory Commission. 1985. United States Nuclear Regulatory Commission Policy and Planning Guidance 1985. NUREG-0885.

B4.2, C3.1

The purpose of the document is to set forth the regulatory approach of the NRC and to provide the supporting principles to that approach; to state the major policies and planning objectives of the Commission; and to provide a common basis for the development of programs, for the establishment of practices and for the allocation of resources. A document such as this is of interest to AECB as a means of comparing its own nuclear regulatory program with that of another country - as a first step in program evaluation.

Policy and planning guidance is given in : "Assuring the Safe Operation of Licensed Facilities"; "Improving Regulation of Nuclear Industry" (which includes new requirements, preparing to license future facilities, standardization, investigations, enforcement, timely licensing of facilities, safety goals, radioactive source terms and siting policy, transportation and advanced reactors); Nuclear Materials and Facilities" (which includes domestic and international safeguards); "Managing Nuclear Waste"; and "Research".

United States Nuclear Regulatory Commission. 1979. (Draft) Generic Environmental Impact Statement on Uranium Milling. Office of Nuclear Material Safety and Safeguards. Vol. I - Summary & Text; Vol. II - Appendices.

C3.1, C4.2.2.1, D2.3, D2.6.2, D2.6.3

The report presents a simulation model approach to assessment of the environmental impacts of a uranium mill in a model environment. It discusses alternative mitigative measures and their cost, proposed monitoring programs and regulatory actions, and presents a proposed regulatory program for the model within the existing governmental structures through to decommissioning and tailings management.

The paper presents an excellent overview of the impacts and regulation of a uranium mill operation and in this regard has application to the technical work of AECB. The more general modelling approach is also a useful evaluative tool with application to a broad range of regulatory activities. It allows the regulator to simulate the performance of the regulatory agency under unusual or crisis conditions and also allows the tracing of regulatory actions through the entire system to detect inconsistencies or inefficiencies in procedures. This type of simulation may provide an ideal evaluative tool for programs which appear difficult to evaluate using more conventional methods.

United States Nuclear Regulatory Commission. 1975. Reactor Safety Study. An Assessment of Accident Risks in U.S. Commercial Nuclear Power Plants. NUREG 75/014, WASH-1400. C3.1, C4.2.2.2, D2.3, D2.6.2, D2.7

This is a study by an ad hoc group assembled by the Atomic Energy Commission to assess the risks of nuclear accidents. The study was independent of the AEC operating and regulatory organization, but did use a few of the staff as well as many contractors. The various concepts involved in risk determination, the probabilities of accidents, society's and the individual's risks and the quantitative measurement of risk are discussed. It describes ways in which radioactivity could be released from power plants and explains methods used in defining the probability of this occurrence, and the associated releases of radioactivity.

Risk assessment methodology is described, quantitative risks of reactor accidents are assessed and there is a comparison of nuclear risks with other risks. Much detail is provided on the development of probabilities of event occurrences and systems failure, and event and fault tree analysis is described. A model is developed to calculate the consequences of an accident. The methods are relevant to AECB in assessing the safety of Canadian plants as the methods used can be adapted to different technologies. For an evaluator the report provides detailed and relevant methodological examples. These offer, for example, the possibility of assessing whether regulatory measures have succeeded in keeping accidents and failures to predicted levels.

United States Office of Science and Technology. 1972. Cumulative Regulatory Effects on the Cost of Automotive Transportation (RECAT). Final Report of the Ad Hoc Committee.

D2.4, D2.6.3

This report includes cost-benefit analyses of the regulatory requirement of air pollution control and safety features on automobiles and of the requirement of safety features in highway design. Although this is a relatively old report it provides a very useful example in its analytical method. The approach would be relevant to AECB regulation aimed at protecting the health of workers in the nuclear industry and of the public at large. The report discusses some of the problems encountered in the analyses undertaken for the Committee and makes reference to more detailed contributory technical studies.

United States Office of the Comptroller General. 1984. Report to the Congress. Cost-Benefit Analysis Can be Useful in Assessing Environmental Regulations, Despite Limitations. General Accounting Office GAO/RCED-84-62

C4.2.1, D2.4

This report focusses on the EPA to evaluate how useful cost-benefit analysis has been, or can be, in assessing environmental regulations. It addresses the adequacy of available data used in the EPA's cost-benefit analyses, legal restrictions in the use of these analyses, and EPA's implementation of Executive Order 12291 requiring federal agencies to prepare such analyses before taking major new regulatory initiatives, renewing major existing regulations and developing legislative proposals. Cost-benefit analysis is discussed in relation to its ability to provide decision-makers with useful information on what level of standard and accompanying regulation should be recommended for environmental protection.

The state-of-the-art of cost-benefit analysis was obtained from the published regulatory agenda. A detailed review was done of three of EPA's cost-benefit analyses which they considered to be state-of-the-art. They were analysed to evaluate whether they gave precise and unbiased results - criteria used as guidelines are given. The findings were checked against a literature survey and augmented by interviews with personnel familiar with cost-benefit analyses of safety regulations from OSHA, FDA and CPSC.

The effects of legal restrictions on cost-benefit analysis results were analysed by interviewing officials of EPA, OMB, OSHA, NRDC and the Business Roundtable, and by reviewing statutes, legislative histories and related court cases.

Problems encountered with Executive Order 12291 were assessed by studying the three cost-benefit analyses for correctible rather than state-of-the-art problems in light of the Order and OMB guidance. Again evaluation criteria are given. EPA's method for computing the cost of major and minor rules was reviewed, and the cost calculations for effluent limitation guidelines were examined by looking at the federal register notices available on proposed final guidelines.

This is relevant to AECB because, as a regulatory agency, it would have similar problems with cost-benefit analyses - how to put a price on a not readily measurable commodity.

United States Office of the Comptroller General. 1981a. Report to the Congress. Electric Power : Contemporary Issues and the Federal Role in Oversight and Regulation. General Accounting Office EMD-82-8

C3.1, D2.4

This is a report providing Congress with a discussion of important issues in electric power regulation and management, recent GAO reports on some of those issues, and questions and observations about power system planning and development which deserve federal attention. The authors give their own observations on power system planning and management, drawn from their own reviews of the subject, including observations on federal and state regulation.

A history and profile of the industry is given first, followed by a section on regulation, which sets out federal and state regulations and the responsibilities of the various federal agencies. The section on state regulation covers load forecasting and resource planning, power plant siting and certification, environmental protection, developing alternative energy sources and protecting the utilities' financial positions. In the section on federal regulations the authors discuss increasing regulation in response, in part, to public concern about nuclear safety. They also discuss regulating for long-term solutions as opposed to reacting to crises.

Some of the subjects discussed under "Issues and Observations" are cost and economy related, others are matters of organizational and management efficiency, and there is a section on changing regulations to reduce the time needed to develop a new power plant.

The report is of interest to AECB as the issues dealt with are common to all nuclear power plants and are discussed as problems facing regulators. It gives insight into what another country perceives as its regulatory problems and how it deals with them, and what problems arise because it has a different regulatory structure. It would help AECB in deciding what areas to evaluate and the types of questions to be addressed.

United States Office of the Comptroller General. 1981b. The Effects of Regulation in the Electric Utility Industry. Report tor the Congress. GAO EMP-81-35.

C3.1, C4.1.1, C4.2.1, D2.4

This study assesses whether the regulatory climate in the U.S. since 1970 has become too onerous. It asks whether regulation has exceeded the initial intentions and has become too costly in terms of observable benefits. It examines whether financial viability of the industry is threatened by over regulation. To answer these questions the authors determined how four utility companies have fared during the decade under more stringent regulatory controls. They identified costs and benefits to the industry associated with the regulatory requirements. They reviewed the economic health of the industry today and its future ability to meet power demands. Finally they identified where the regulatory approach could be revised.

The study used a wide range of information obtained from electric utilities, State Commissions, Federal Agencies, investment analysts and industry organizations as well as literature reviews. The costs of operation encountered in complying with regulations were obtained from the four utilities and a perspective on the accuracy of this information was gained from the applicable State Agencies. Where discrepancies arose, the rationale and logic behind the requirements was checked. The Federal Agencies were then consulted. The methods used to develop and implement regulatory requirements, their intent, and their specific resultant impacts on the utility and the consumer were analysed. The financial and operational posture of the utilities was obtained from a literature search and consultations with their investment analysts, counsellors and industry organizations. The report gives the actual estimated regulatory costs for the four utilities by agency and by regulatory goal and discusses each, as well as the objectives of the different types of regulation.

The issues and methods in this study are potentially applicable to an evaluation of the impacts of AECB's regulatory program.

United States Office of the Comptroller General. 1980. Report to the Congress of the United States. Sept 9, 1980. Three Mile Island : The Most Studied Nuclear Accident in History. EMD-80-109. Washington D.C.

D1

This is an evaluation of reports on the accident at Three Mile Island. It examines the scope, approach and consistency of findings. With the aid of consultants, the reasonableness of conclusions and recommendations are reviewed, and discussions held with members of the investigating teams. The data in the reports were verified to determine their accuracy and completeness. This is an example of meta evaluation as described by Wortman (1983, see this bibliography). It is of interest to AECB because of its subject matter and as a method of determining whether its own evaluations are effective.

United States Presidential Task Force on Regulatory Relief. 1983. Reagan Administration Regulatory Achievements. U.S. Dept. of Energy.

C2

The report outlines the processes and principles of the Reagan Administration's regulatory policy, its administrative accomplishments and legislative initiatives - completed and pending.

A brief history of the regulatory climate over the past two decades and the rationale behind the regulatory reform initiatives is given. Executive Order 12291 is described. It requires assessment of economic effects of all proposed and final regulations, with the bottom line that the benefits to society as a whole should be more than the cost of the regulation. A list of ten regulatory policy guidelines is itemized and discussed in detail. Some of these would be of interest to AECB as evaluation issues, such as those pertaining to licensing and permits, health and safety risks, and the environment. One section of the report discusses legislation which has been reviewed, both new and intended, and discusses how well Executive Order 12291 is working in reducing the quantity of legislation and improving the quality. It gives examples of the EPA's regulatory program being helped by changes brought about by the Order. Tables of costs saved by the regulatory reforms are given.

United States President's Commission on Law Enforcement and Administration of Justice. 1967. The Challenge of Crime in a Free Society. A report. Washington D.C.

D1, D2.2, D2.7

The report documents the findings of an extremely wide-ranging, comprehensive inquiry into crime in America. The role of the police, the courts, and the correctional system are all examined; organized crime, drug abuse, and the expanding role of science and technology in crime prevention and investigation are also discussed.

The inquiry was established in response to the growing public concern about crime in the U.S. Its mandate was to investigate the causes of crime and delinquency and make recommendations for preventing crime and improving law enforcement and the administration of justice. The research work of the Commission involved extensive surveys, collection of data from federal and state agencies, the sponsorship of conferences on topics of particular interest, advice from experts in various fields, and use of several task forces to examine particular problems.

The Presidential Inquiry is the equivalent of the Canadian Royal Commission. This report is one example of that approach used to investigate and make recommendations on a subject of wide-ranging public concern. It is unusual in that it includes a description of its investigative methods and it is these that are of interest to evaluators.

United States President's Commission on the Accident at Three Mile Island. 1979a. The Need for Change : The Legacy of Three Mile Island. Final Report. Washington, D.C.

C3.1, C4.1.1, C4.2.2.2, D1, D2.2, D2.6.3, D2.6.4

This is the final and summary report to the President's Commission on Three Mile Island. The Commission was established to : (i) technically assess the events and causes; (ii) analyse the role of the managing utility and the emergency preparedness and response of the Nuclear Regulatory Commission; (iii) evaluate the NRC licensing, inspection and enforcement procedures; (iv) and address the public's right to information. The methods used by the Commission are described. One final report and 30 staff reports covering every aspect of the events and matters pertaining to them were produced. The section on the NRC in this report is very clear and to the point, and would be of interest to AECB in evaluating the adequacy of its own programs.

United States President's Commission on the Accident at Three Mile Island. 1979b. Staff Report. Report of the Public's Right to Information Task Force.

D2.1, D2.2, D2.6.3, D2.6.4

This report analyses the ability of reporters to deal with technological complexity and factual uncertainty while working under pressure, and the ability of Met Ed (the utility) and NRC officials to inform the public under crisis conditions. A number of historical, journalistic and quantitative studies were performed, the details are given, and the findings presented. Both parties were found wanting. The quality of information available to the public in a potentially life-threatening situation is of critical importance. This information has a significant effect on the capacity of people to respond to the accident, on their emotional health and on their willingness to accept guidance from responsible public officials. AECB has a responsibility to the public similar to that of NRC. This report would help AECB to assess whether its public relations program is adequate to respond to an emergency situation because it identifies problem areas and also describes appropriate analytical methods.

Vandervort, L. 1979. Political Control of Independent Administrative Agencies. Administrative Law Series. Prepared for the Law Reform Commission of Canada.

B4.2, C2, C3.1, C4.1.3, D1, D2.1, D2.2

This report gives a description of the legislative schemes in use which provide for executive review and appeal powers, and a detailed review of the exercise of these powers in the last ten years. It gives an assessment of the performance and impact of these powers on the administrative law process, and a proposal of new models for the generation, interpretation, implementation, review and enforcement of regulatory policy.

Chapter VII is particularly relevant. Values to be assessed are identified. These are : (i) openness; (ii) opportunity for informed public and parliamentary debate regarding policy and legislation; (iii) consistency of interpretation of law; and (iv) uniformity of application and enforcement. It also suggests other values which ought to be fundamantal to the regulatory process such as : (i) legislation by representatives of the people; (ii) parliamentary review of legislation made by delegated authority; (iii) ministerial accountability to Parliament; (iv) protection against conflict of interest and abuse of power; (v) judicial independence; and (vi) judicial review. Executive review and appeal powers are examined, and the extent to which it is desirable to have regulatory policies under the control of the executive is questioned. It examines recent judicial decisions in administrative law concerning directives, fettering of discretion of statutory decision-makers, delegation of ministerial powers, bias of administrators, boards and tribunals, the concept of ultra vires and duty of fairness. These are used as indicators of the current trends in administrative law. They are also used in the assessment of current powers of executive review and the ways in which these powers are exercised.

The report raises several important issues that bear directly on AECB's regulatory responsibilities and could be subjects of evaluation.

Van de Ven, A.H. & D.L. Ferry. 1980. Measuring and Assessing Organizations. John Wiley & Sons.

A6, C4.1.2, D2.3,

Van de Ven and Ferry have attempted to develop a scientifically valid and practical approach for assessing the performance of a complex organization in relation to how it is organized and to the environments in which it operates. The book is based on the results of a long-term research project. It describes, evaluates and proposes a framework, a set of measurement instruments and a process for conducting ongoing assessments of complex organizations.

The framework consists of five organization assessment (OA) modules. 1. The Performance Module measures organizational performance and design. A series of meetings are held to identify the decision-makers in an organization and to ask what goals, criteria and standards they consider relevant for judging effectiveness of the organizations, units and jobs to be investigated. 2. The Macroorganizational Module focusses on the structural configuration of an organization, its history, scale of operations and domain. It is measured with organization charts and records, interviews and questionnaires. 3. The Organizational Unit Module uses questionnaires and existing organizational records to measure various characteristics of the tasks, structure and processes of all organizational units or work groups. 4. The Job Design Module measures, with questionnaires, the way in which individual jobs or positions are structured, background characteristics of job incumbents, the organization's technical and functional requirements of the job, and the employee's affective responses to the job. 5. The Interunit Module provides an assessment of the structure and interdependence, coordination and control among organizational units and positions. Questionnaires are used to measure various characteristics of the relationships each organizational unit has with other units within and outside the organization.

Each chapter makes an in-depth description and evaluation of the OA theory and measurement instruments for one of these modules. The appendices contain a glossary of OA instruments, examples of questionnaires used and a section detailing how to compute structural indices of interunit networks. The book provides a set of survey procedures and measurements that an evaluator could use to diagnose the strengths and weaknesses in the structure of AECB organization and to evaluate its efficiency.

Vickers, Sir G. 1980. Responsibility : Its Sources and Limits. Intersystems Publications : Seaside, California. The Systems Inquiry Series.

A5, C4.1.2

This is a series of papers concerned with the nature of personal responsibility and the causes of its present eclipse; the nature of many organizations which claim the responsible man's allegiance as a member; and the extent to which he can reconcile often conflicting demands. The first four papers examine the imperative nature of the sense of responsibility, whence it comes and what determines its scope, strength and content. The next four examine the systemic nature of the situations which demand our understanding and responsible participation, and discuss ways to extend our understanding of them. The last considers the possibility of creating a human world sufficiently stable to give any scope for responsible choice, and the conflicting current trends which made the aspiration so important and its achievement so doubtful.

The interest of these papers to evaluators of regulatory programs is in the insight they offer into program management issues. This can be particularly valuable in defining evaluation questions where the efficiency of a program and its management is under scrutiny.

Von der Porten, E.P. 1969. The German Navy in World War II. Galahad Books, New York.

D1

This book is an excellent example of history as program evaluation. The author evaluates the efficiency and effectiveness of the German Naval Program from 1919 to 1945. He finds the efficiency good but the effectiveness weak, and proceeds to a conclusive analysis of the reasons for both observations. The book is particularly interesting to evaluators for the clarity of its analysis of the relationship between policy, direction and administrative process. This is of interest to AECB because it shows how the limits of achievability of programs might be estimated, thus providing an absolute standard for evaluations.

Walker, W. and M. Lonnroth. 1983. Nuclear Power Struggles - Industrial Competition and Proliferation Control. George Allen & Unwin.

C3.1, D2.7

The book discusses changes in the industrial arena and the political and strategic implications of such changes on the proliferation of nuclear weapons. On one hand, orders for nuclear power stations have slumped and the rate of diffusion of technological information has slowed, but on the other hand, nuclear suppliers need export orders and there is a risk that trade standards will be degraded due to competative pressures. For example, the United States nuclear industry was dominant 10 years ago, but is now fighting to maintain its international market. The leadership in this field now seems to be moving to France, West Germany and Japan which may have profound influence on the non-proliferation regime. The main actors need to redefine their roles and responsibilities.

The subject is introduced with a summary of the evolution of nuclear trade relations since World War II. Chapter 2 examines the structures and conditions of nuclear reactor industries in the main exporting countries (including Canada) and the adjustment problems they face. The behaviour of nuclear exporters in the international market is discussed. The political and strategic context in which nuclear trade policy will have to be formulated in the 1980's is examined, including problems confronting key agencies. The relations between the major nuclear suppliers and the transatlantic differences between trade policies is next discussed. Finally the authors comment on the fundamental asymmetry of nuclear arms control - the unequal treatment of the "haves" and "have nots". This would be a very useful book to evaluators of AECB's information control and security programs.

Waverman, L. 1982. The Process of Telecommunications Regulation in Canada. Economic Council of Canada. Working Paper # 28. Regulation Reference, Economic Council of Canada.

D1, D2.2

In this report the regulation of telecommunications, especially rate setting, is examined in three jurisdictions - the CRTC, the Nova Scotia Board of Commissioners of Public Utilities and a publicly owned company regulated by the Government of Saskatchewan. Advantages and disadvantages of regulation by a statutory regulatory agency, by a government department and by the publicly owned company are examined against the nature of the legislation (such as appointment and tenure rules, budget, appeal mechanisms, rules for financial independence of the regulator) and procedural issues (such as notice and rules for standing budget allocations). Recommendations are given.

The report is primarily interested in the objectives of regulations and how the administrative process accomplishes these. It then looks at specific economic motivations for regulation, tempered by lawyers' concepts of proper administrative processes. The key question it addresses is : does the the design of a regulatory process ensure independence of regulatory decisions from short-term political expediency, while ensuring that the regulators are accountable ?

This paper is interesting because it looks at how three different jurisdictions handle the same regulatory problems. The issues raised are likely to arise in evaluations of AECB's regulatory program.

Weiss, C.H. 1972. Evaluation Research. Englewood Cliffs, N.J. : Prentice-Hall, Inc.

A6, D2.1, E2

This is a basic textbook dealing with the application of research methods to the evaluation of social programs. The theme of the book is that evaluation uses the methods and tools of social research but applies them in an "action" context that is intrinsically inhospitable to them. It therefore aims to acquaint the reader with the realities of evaluation. The book discusses the purposes of evaluation, both overt and covert, formulating questions and measuring answers, design of the evaluation, the turbulent, ever-changing setting of social programs and the utilization of evaluation results. This book would be useful to commissioners of evaluation in AECB both in terms of defining the scope and content of evaluation and in making use of its results.

Welborn, D.M. 1977. The Governance of Federal Regulatory Agencies. Knoxville, Univ. of Tennessee Press.

B3, C4.1.1, C4.1.2, D1, D2.1, D2.3

The author reviews the internal working of the "big seven" U.S. economic regulatory agencies : the Civil Aeronautics Board, the Federal Communications Commission, the Federal Maritime Commission, the Federal Power Commission, the Federal Trade Commission, the Interstate Commerce Commission and the Securities and Exchange Commission. The relationships between the Chairmen, Board Members and Commission Staffs were examined by means of extensive interviews and document review. The author is particularly interested in the division of authority, labour, resources and accountability between these groups within regulatory agencies and its effects on : (i) the mode of operation and efficiency of the agencies ; (ii) how an agency makes decisions ; and (iii) how responsive these decisions are to various kinds of political pressure. Although the examples in the book are from American economic regulation, the penetrating discussion of the organization and interplay within agencies raises questions of interest to evaluators of any regulatory program.

White, L.J. 1981. Reforming Regulation : Processes and Problems. Englewood Cliffs, N.J., Prentice Hall.

C2, C3.1, C4.1.1, D1

This book is about the Carter administration's regulatory reform effort. It explains what a number of regulatory programs were designed to achieve and how the regulations were established and administered. The author was a senior staff economist with the Council of Economic Advisors and the book concerns some of the major regulatory issues that arose during his eleven months there. Given first is a background on the CEA and on regulatory procedures and issues in general, including an economists general approach to regulatory problems. The book focusses on twelve case studies. Each case study includes the background to the regulatory issue, an analysis of the issue itself and of the conflicting positions taken on it, the steps in the decision-making process, the outcome and some concluding comments. The book concludes with a summary of the lessons that can be learned from the case studies, a review of the strengths and weaknesses of the regulatory reform effort and a number of recommendations for improvements in public policy.

A number of themes and lessons emerge from the book. These are : the great difference between the old-style economic regulation and the new-style health-safety-environment regulation; that regulators tend to think in only black and white with respect to the health-safety-environment regulations i.e. a chemical is either safe or unsafe; regulatory bodies still need to improve their appreciation of the costs of regulation; there is a need for the cooperation of regulatory agency lawyers in the regulatory reform effort; and there are time and expertise limits on how much can be achieved by CEA and similar agencies.

Some of the case studies and analytical methods would be of interest to AECB. For example, the study on abandoned chemical dumps and spills of hazardous substances provides an example of the drafting of a major piece of environmental legislation; and the study on the premanufacture notification for chemical production shows that there are ways of reducing the reporting burden without lessening the effectiveness of the ultimate regulatory control. The book is a source of help in defining problems in regulatory reform, and a topic of pressing current interest in Canada.

Wholey, J.S. 1978. Zero-Base Budgeting and Program Evaluation. Lexington Books.

A6, D2.1, D2.4

The author discusses simplified zero-base budgeting (ZBB) as a program evaluation tool that can be used by decision-makers to control costs and improve efficiency and effectiveness. The methods are illustrated by use of examples from local government and federal and state agencies.

The method is based on program managers identifying their lowest priority activities (those they would be prepared to sacrifice if a 10-15% funding cut were instituted) and then identifying the consequences of eliminating or reducing those programs. At the same time, managers are asked to propose new programs or expansion of existing ones to utilize the available resources.

As a general technique, ZBB has wide application for both short- and long-term planning and evaluation. It is most useful where the consequences of program cuts are readily seen, as in programs with easily quantified outputs or impacts.

The book provides a comprehensive treatment of ZBB as a program evaluation tool and would be a useful introductory reference for AECB. Its examples are drawn mostly from social or service programs but some are analagous to elements of AECB's program.

Williams, R. 1980. The Nuclear Power Decisions: British Policies 1953-78. Croone Helm, London.

C3.1, C4.1.3, C4.2.2.1, D2.6.3

Williams provides a historical account of the development and regulation of the nuclear industry in the U.K. The principal theme of his book is the need for more accountability. It advocates independent evaluation of the British Atomic Energy Authority, particularly with respect to economic matters. Some interesting and relevant insights are also offered on the irrational nature of public intervention in the "nuclear debate". The value of this book to AECB is in its description of a process that is esentially parallel to that in Canada. It does not, however, present a model to be followed.

Willrich, M. & R.K. Lester. 1977. Radioactive Waste : Management and Regulation. The Free Press, New York.

B4.2, C3.1, C4.2.2.1, D2.6.3

The authors describe existing methods of management of radioactive waste and the problems associated with them. They go on to describe U.S. law, regulations and regulatory processes pertaining to waste management that were in effect in 1977. These are reviewed by conventional scholarly analysis and found wanting. Alternative regulatory systems, with emphasis on interdepartmental and intergovernmental coordination, are proposed. The authors favour a centralised national agency for the regulation and management of radioactive waste. There are useful ideas in this book about evaluation issues and the framing of evaluation questions in relation to regulation of nuclear waste management.

Wilson, J.M.R., M. Belanger, and A.L. Campbell. 1975. Report of the Independent Review Committee on the Office of the Auditor General of Canada. Government of Canada.

A3, D1

This review was commissioned because of difficulties encountered by past Auditors-General in performing their duties as set out in legislation. The review was conducted in tabula rasa form : the committee set out to design the ideal auditor-general program without direct reference to past failures. Nevertheless the review proceeds with these in mind and does refer to them from time to time. It therefore has many of the characteristics of a program evaluation that deals with the rationale and mandate of a program. The review includes descriptions of auditor-general functions in other countries and defines some questions that are asked in classical audits and in "value for money" auditing. These are of interest to evaluators of regulatory programs.

Wilson, J.Q. (Ed.) 1980. The Politics of Regulation. Basic Books Inc.

B3, C2, C4.1.1, C4.1.2, D1, E1, E2

This book includes an introduction and a concluding chapter by Wilson and a series of contibuted essays each of which deals with one American regulatory agency. The perspective is that of political science. Each essay focusses on how goals were determined, conflicts resolved or managed, standards set and policies enforced. Each author describes the legislation, procedures and practices of the agency with which he deals, and criticises its performance. The approach is scholarly - several of the papers are based on Ph.D. theses. The chapter on the Occupational Health and Safety Administration and the EPA are of most interest to AECB.

Wilson's concluding chapter includes sections on the political origins of regulatory agencies, on the behaviour and motives of individuals within regulatory agencies and the influence on regulatory agencies of changes in public opinion ("the regulatory environment"). These are of value in the definition of evaluation issues. Wilson's final observations are about limitations imposed on the efficiency and effectiveness of regulatory agencies by the complexity and magnitude of their tasks. These are relevant to establishing standards against which to evaluate regulatory performance.

Wolanin, T.R. 1975. Presidential Advisory Commissions - Truman to Nixon. U. of Wisconsin Press.

D2.2

The book is a study of the purposes, procedures, impacts, and success or failure of Presidential advisory commissions in the period 1945 to 1972. Ninety-nine commissions are examined in varying degrees of detail. The report uses standard investigative techniques (document review, research, interviews) to describe the roles and actions of commissions over a 25-year period. This is in fact evaluation on two levels as the report itself is an evaluation of the presidential commission in its primary role as an evaluative tool.

Presidential commissions fulfil essentially the same role as Royal Commissions in Canada and Britain. The report would be useful as background information if AECB were to commission an independent inquiry.

Woods Gordon. 1983. Development of Principles of Regulation for the Trucking Industry. Report on the Decision Making Process. Report Prepared for the Public Commercial Vehicles Act Review Committee, Ontario.

C3.1, D1

This report describes how Woods Gordon assisted the Public Commercial Vehicles Review Committee in its decision-making process. (The report of this Committee is reviewed under Ontario, 1983, in this bibliography.) It deals with the measures taken to try to ensure that the Committee would form a consensus and that choices made by the Committee would result in the most desirable set of principles for its recommendations. The consultant worked with support staff to develop suggested alternative decision methods, agenda and process for the Review Committee meetings. These were discussed with a Steering Committee (a subcommittee of the Review Committee) which then decided what methods to recommend for the Review Committeee meetings.

The methods suggested focussed mainly on providing structure to the consideration of alternatives. They described the basic concepts for defining alternatives; indicated how objectives and criteria could be identified and related to the alternatives; and showed how the alternatives could be evaluated for desirability against the objectives and criteria. The Review Committee followed the structured approach to some extent, especially the process framework for defining alternatives in terms of regulatory scenarios. Woods Gordon feels that the Review Committee recommendations were more defensible as a result of the consultant's assistance.

This is of interest to AECB as this type of approach could be used for any committee to ensure that consideration of all alternatives is covered fairly.

Wortman, P.M. 1983. Evaluation Research : A Methodological Perspective. Annual Review of Psychology 34:246-260.

A1.1, A3, D1, D2.1, D2.4

This review paper discusses in detail three major approaches to evaluation research - social experimentation, meta-analysis, and cost-effectiveness analysis

The section on social experimentation deals with the randomized, rigorous, strictly quantitative studies prevalent in evaluation of social and health programs. The account is jargon-ridden and somewhat impenetrable for the non-specialist. Application of this type of analysis to AECB is limited. Useful discussion is made however of the value of combining quantitative and qualitative methods of inquiry, resulting in a more comprehensive evaluation in which the conclusions are not biassed by the statistical limitations of quantitative techniques.

Meta-analysis is the "analysis of analyses". It is another rigorously statistical technique used to synthesize previous research results and to analyse existing studies to determine the magnitude of the effects of a program. Again its utility lies in assessing the impact of a program based on easily quantified parameters within a large body of existing research (e.g. analysis of several studies of the usefulness of a certain drug for treatment of a medical condition).

Cost-effectiveness (CEA) and cost-benefit (CBA) methods of evaluation are used to determine if a program is efficient in its use and allocation of scarce resources. The two methods are methodologically similar and complementary but differ somewhat in application. CBA expresses all benefits in monetary terms and can thus be used to compare programs of a quite different nature. CEA values benefits in some unit other than money (e.g. quality of life, life expectancy) and can thus only be used to compare programs with similar objectives. The paper lists the 10 accepted steps in the CBA/CEA methodology and discusses each briefly. This technique is the one of most application to an AECB evaluation program. The article provides a very useful background reference, although its examples are all drawn from sociology, psychology, health, and education and its overuse of jargon is intimidating to the general reader. Its bibliography is extensive and current.

Wraith, R.E. and G.B. Lamb. 1971. Public Inquiries as an Instrument of Government. George Allen & Unwin Ltd., London.

D2.2

The book is a study in a series of major research projects sponsored by the Royal Institute of Public Administration, on British public inquiries. It begins with a history of public inquiries. A section on the subjects of inquiries examines 14 areas where inquiries have been used. It discusses why they were held, what they were about, what form they took and what they achieved. Those of the Ministry of Technology, Department of Health and Social Security, and Housing and Local Government (which includes health) might be of interest to AECB. A chapter on the statutory setting of public inquiries discusses the legal definition and powers of commissions of inquiry, and their procedures and their protagonists. Problems with public inquiries are dealt with in some detail. These include third party interests and rights, the issue of policy, and problems of administration such as costs and award of costs to objectors. Policy issues discussed include to what extent statements of official policy should be furnished to parties of the inquiry, and to what extent can they be discussed. The chapter on public inquiries in perspective classifies them by basic function and by judicial decisions or objectives, and evaluates their effectiveness. The value of the report to AECB is in the methods used and problems encountered in using this kind of inquiry as a form of evaluation.

Wright, J.D., P.H. Rossi, K. Daly. 1983. Under the Gun : Weapons, Crime and violence in America. Aldine Publishing Company, New York.

D2.7

This is a review and analysis of the available studies on weapons, crime and violence in the United States. It tries to determine from all the available knowledge what facts are firmly and certainly established; those hypotheses that are adequately supported or approximately consistent with the best available research evidence; and those areas where more needs to be known. It tries to judge each study on its own merits and not on how effectively it argues its case. It tries to provide a reliable information base on which policy decisions can be made.

Only the section on weapons control legislation and effects on violent crime would be of direct interest to AECB. It is a study of the effectiveness of legislation, and many of the points raised would apply to any legislation affecting human behaviour - such as licensing requirements. This section reviews the technical issues involved in assessing the effectiveness of gun control legislation when enacted, as well as some of the landmark studies that have attempted to estimate the direction and magnitude of its effects. The authors discuss some of the critical technical issues that arise in assessing the impact of legislation on an area of human behaviour.

Zammuto, R.F. 1982. Assessing Organizational Effectiveness. State University of New York Press, Albany.

A2, A5, A6, C2, C3.2, C4.1.2, D2.1, D2.3, E1, E2

The book proposes an evolutionary model for assessing the performance of organizations. Previous models of effectiveness evaluation view the organization in isolation and assess its ability to meet goals, which have most commonly been set by the organization itself. Zammuto's model examines effectiveness from the perspective of "constituent preferences" (i.e. the public's demands for performance) and environmental constraints (what is possible in terms of performance at that time, given external controls on performance-related variables). The balance between preferences and constraints provides a definition of what is possible, what is the potential of the organization, and, ultimately, what are the alternative courses of action open to the decision-maker and which are appropriate.

The author discusses past models and research on effectiveness in a literature review chapter. This chapter and its bibliography are useful sources for information on past and current approaches to effectiveness assessment. He describes these predominantly goal-based models under three categories, defined by their initial assumptions about the organization and its objectives.

The third chapter presents Zammutos's "evolutionary" model based on examination of an organization within the context of its environment. The description of the model draws many analogies to the natural environment in terms of adaptation, adaptability, feedback, and niche creation and expansion.

The final chapters present two case studies. The first is an evaluation of a government program and illustrates the differences in the type of information decision-makers receive from a goal-based and an evolutionary evaluation model. The second case study looks at strategic decision-making in the U.S. automotive industry in the 1970's.

In viewing the organization as part of a larger system, the model allows decision-makers to determine if they are truly being effective in meeting the current expectations of their constituents. It alerts them to changing preferences and constraints and enables them to evolve to accommodate those changes, either by adapting or by creating and filling new niches.

The summary chapter discusses the implications of the evolutionary model for evaluation and managerial practice. Zammuto presents a framework and methodology for evaluation which has great potential for AECB.

5. Contents of Bibliography by Subject and Author

In this section we list the references in the bibliography by the sections into which we have classified them. The headings describe the contents of each section. The references are cited by authors. This provides easy access to the bibliography which is arranged in alphabetical order by the names of first authors.

A : Initiating Program Evaluation

A1 : Definitions of Program Evaluation

A1.1 : Historical Origins

Hartle 1978; Hyde and Shafritz 1979; Lyden and Miller 1978; Treasury Board 1981a; Wortman 1983.

A1.2 : Definitions of Program Evaluation

Hyde and Shafritz 1979; Treasury Board 1981a.

A2 : Usefulness of Program Evaluation

Berry 1982; Connor *et al.* 1984; Hicks 1981; Palumbo and Nachmias 1983; Zammuto 1982.

A3 : Where Evaluation Fits in the Management of Government Services

Alberta 1985; Australia 1976; Connor *et al.* 1984; Doern and Maslove 1979; Economic Council of Canada 1981, 1979; Hartle 1978; Hyde and Shafritz 1979; Jackson 1982; Keeling 1972; Kernaghan 1983; Law Reform Commission 1980; Lyden and Miller 1978; Nielsen 1985; Palumbo and Nachmias 1983; Pois 1979; Rees 1980; Reschenthaler 1972; Steiss 1982; Treasury Board 1981a; Wilson, Belanger and Campbell 1975; Wortman 1983.

A4 : Steps in Program Evaluation

Austin and Associates 1982; Borich and Jemelka 1982; Connor *et al.* 1984; Rutman 1980; Rutman and de Jong 1976; Treasury Board 1985, 1981a and b.

A5 : Commissioning Evaluations

Borich and Jemelka 1982; Cairns 1980; Connor *et al.* 1984; Hicks 1981; Hyde and Shafritz 1979; Jordan and Sutherland 1979; Laframboise 1983; Law Reform Commission 1980; Reschenthaler 1972; Science Council of Canada 1982; Treasury Board 1984 and 1981a; U.S. Executive Office of the President 1985; Vickers 1980; Zammuto 1982.

A6 : Some General References

Adam and Dogramaci 1981; Austin and Associates 1982; Borich and Jemelka 1982; Connor et al. 1984; Flesher and Siewert 1982; Freeman and Solomon 1981; Grinnell 1982; Hatry et al. 1976, 1973; Hicks 1981; Hyde and Shafritz 1979; Kaufman and Thomas 1980; Mazmanian and Sabatier 1981; Murphy 1981; Patton 1980; Poister 1978; Rossi et al. 1979; Rutman 1980; Rutman and de Jong 1976; Sayle 1981; Thierauf 1980; Treasury Board 1985, 1984, 1981a and b; Van de Ven and Ferry 1981; Weiss 1972; Wholey 1978; Zammuto 1982.

B : The Descriptive Step

B3 : Properties of Descriptive Models

Berry 1982; Brantingham 1981; Brown-John 1976; Cairns 1980; Economic Council of Canada 1981, 1979; Doern 1979; Doern et al. 1975; Franson et al. 1982; International Nuclear Energy Agency 1983; Kelman 1981; Law Reform Commission 1980; Mitnick 1982; Reschenthaler 1972; Royal Commission on the Ocean Ranger Marine Disaster 1984; Stanbury 1980, 1978; Stanbury and Thompson 1982; Treasury Board 1981a; U.S. Advisory Committee on Intergovernmental Relations 1980; Welborn 1977; Wilson 1980.

B4 : Relevant References in the Bibliography

B4.1 : Methodological References

Borich and Jemelka 1982; ESSA 1982; Hoos 1983.

B4.2 : Examples of Descriptions

Anderson 1981; Asmis 1981; AECB 1983; Breyer and MacAvoy 1974; Cottrell 1980; Dale-Johnson 1981; Doern 1977b, 1976; Doern et al. 1982, 1975; Domaratzki 1984; Dory 1982; Felske and Associates 1981; Fox 1979; Gibson 1978; Gorecki 1981; Gorinson 1979; Gummer 1982; Hamel 1981; I.D. Systems 1984; International Nuclear Energy Agency 1983; Ishack 1981; Janisch et al. 1978; Jennekens 1981, 1980; Johnston 1980; Joyce 1981; Law Reform Commission 1980; Leadbeater 1980; Leggat 1971; Lucas and Bell 1977; Marchildon 1983; Muller and Associates 1977; Nemetz et al. 1981; Nix and Clayton 1980; Penelle 1985; Peters J.E. 1982; Pois 1979; Priest 1982; Proudfoot 1980; Quebec 1985; Reid Crowther and Partners 1980; Rohlich and Howe 1981; Saskatchewan 1984; Scarano and Linehan 1979; Scott and Neher 1981; SECOR 1984, 1980; Sims 1980; Slatter 1982; Smith 1982; Stevenson and Thomas 1983, 1982a and b; Trebilcock et al. 1982; U.S. Executive Office of the President 1985; U.S. Inter Agency Review Group 1979; U.S. National Research Council 1977; U.S. Nuclear Regulatory Commission 1985; Vandervort 1979; Willrich and Lester 1977.

C : Identifying Evaluation Issues and Defining Questions

C2 : Values and Perspectives

Borich and Jemelka 1982; Cairns 1980; Clark et al. 1980; Connor et al. 1984; Doern 1982, 1977a; Economic Council of Canada 1981, 1979; Hoos 1983; Hyde and Shafritz 1979; Jordan and Sutherland 1979; Law Reform Commission 1980; Meyers 1977; Nielsen 1985; Poister 1978; Posner 1981, 1977; Reschenthaler 1972; Rutman 1980; Rutman and de Jong 1976; Schrecker 1984; Science Council of Canada 1982; Stanbury and Thompson 1982; Treasury Board 1981b; U.S. Executive Office of the President 1985; U.S. Presidential Task Force on Regulatory Relief 1983; Vandervort 1979; White 1981; Wilson 1980; Zammuto 1982.

C3 : Identifying Generic Issues

C3.1 : Generic Issues

Ash 1971; Austin and Associates 1982; Australia 1976; Aviel 1982; Basuk and Nichols 1979; British Columbia 1980; Brown-John 1976; Chayes and Lewis 1977; Clark et al. 1980; Doern 1982, 1977a, 1976; Doern and Morrison 1980; Doern et al. 1975; Domaratzki 1984; Economic Council of Canada 1979; Eichholz 1976; Ferguson 1981; Freeman and Solomon 1981; Hatry et al. 1976; Jackson 1982; Jennekens 1980; Kaufman and Thomas 1980; Keeling 1972; Kernaghan 1983; Krass et al. 1983; Law Reform Commission 1980; Noll 1971; Ontario 1978, 1976; Pannell and Campbell 1980; Shrader-Frechette 1980; Stanbury 1980, 1978; Stanbury and Thompson 1982; Stockholm Peace Research Institute 1979; Treasury Board 1985; U.K. Royal Commission on Environmental Pollution 1976, 1972; U.S. Inter Agency Review Group 1979; U.S. Nuclear Regulatory Commission 1985, 1979, 1975; U.S. Office of the Comptroller General 1981a and b; U.S. President's Commission on the Accident at Three Mile Island 1979a; Vandervort 1979; Walker and Lonnroth 1983; White 1981; Williams 1980; Willrich and Lester 1977; Woods Gordon 1983.

C3.2 : Use of Descriptive Models to Define Questions

Borich and Jemelka 1982; Canada Health and Welfare 1984; Colorado State University 1975; Connor et al. 1984; ESSA 1982; Hoos 1983; I.D. Systems 1984; Ikeda and Winterfeldt 1982; LGL, ESL, ESSA 1984; Rutman 1980; Smith 1982; Treasury Board 1985; Zammuto 1982.

C4 : More Specific Questions

C4.1 : Process-Oriented Approaches

C4.1.1 : Entire Regulatory Programs

Britain 1981; Burn 1967; Doern 1976; Fry and Morison 1982; Gibson 1978; Gordon 1981, 1980; Gorinson 1979; Janisch *et al.* 1978; Johnston 1980; Joyce 1981; Law Reform Commission 1980; Leadbeater 1980; Lucas and Bell 1977; Mazmanian and Sabatier 1981; Nix and Clayton 1980; Ontario 1983, 1978; Pannell and Campbell 1980; Pearse 1982; Pois 1979; Reschenthaler 1978; Royal Commission on the Ocean Ranger Marine Disaster 1984; Schrecker 1984; Science Council of Canada 1982; Scott and Neher 1981; U.S. National Research Council 1977; U.S. Office of the Comptroller General 1981b; U.S. President's Commission on the Accident at Three Mile Island 1979a; Welborn 1977; White 1981; Wilson 1980.

C4.1.2 : Efficiency of the Regulatory Process

Adam and Dogramaci 1981; Ash 1971; Australia 1976; Bardach and Kagan 1982; Britain 1981; Canada Office of the Auditor General 1978; Colinvaux 1982; Denton 1977; Doern *et al.* 1975; ESSA 1982; Flesher and Siewert 1982; Goldhaber 1979; Hall 1980; Hanser 1965; Hartle 1978; Jackson 1982; Jordan and Sutherland 1979; Keeling 1972; Leadbeater 1980; Lewis 1980; Maybee 1984; Mazmanian and Nienaber 1979; Murphy 1981; Ontario 1982; Palumbo and Nachmias 1983; Price 1968; Sayle 1981; Steiss 1982; Stewart and Garson 1983; Thierauf 1980; U.S. Dept. of Energy 1982; U.S. General Accounting Office 1984; Van de Ven and Ferry 1980; Vickers 1980; Welborn 1977; Wilson 1980; Zammuto 1982.

C4.1.3 : Political Process

Bardach and Kagan 1982; Chubb 1983; Courville 1980; Dewees 1980; Doern 1979, 1976; Ebbin and Kayser 1974; Economic Council of Canada 1981; Englehart and Trebilcock 1981; FEARO 1980, 1979; Ferguson 1981; Fowler 1982; Fox 1979; Freeman *et al.* 1973; Hahn 1982; Kernaghan 1982; Law Reform Commission 1980; Matthews 1976; Organisation for Economic Cooperation and Development 1972; Posner 1977; Priest 1982; Reschenthaler 1972; Richardson 1976; Schultz *et al.* 1980; Slatter 1982; Trebilcock *et al.* 1982; Tupper and Doern 1981; U.S. Advisory Committee on Intergovernmental Relations 1980; Vandervort 1979; Williams 1980.

C4.2 : Impact-Oriented Approaches

C4.2.1 : Entire Program

Alberta 1985; Berry 1982; Brantingham 1981; Cairns 1980; Canada Health and Welfare 1984; Clark et al. 1980; Colorado State University 1975; Cook and Woods Gordon 1981; Dale-Johnson 1981; Doern 1979; Economic Council of Canada 1981; Environmental Resources Ltd. 1983; Felske and Associates 1981; Ferguson 1981; Finsterbusch 1980; Fromm 1981; Globerman and Rothman 1983; Gorecki 1981; Hartle 1978; Hatry et al. 1973; Hoos 1983; I.D. Systems 1984; Institute for Energy Analysis 1979; Jordan and Sutherland 1979; Karam and Morgan 1976; Kernaghan 1983; Krutilla et al. 1978; McCabe 1978; Miller and Yandle 1979; Nemetz et al. 1981; Nielsen 1985; Posner and Scott 1980; Richardson 1976; Rohlich and Howe 1981; Rossi et al. 1979; Saskatchewan 1982; Scott and Neher 1981; SECOR 1980; Smith 1982; Stanbury 1980, 1978; Treasury Board 1985, 1981a and b; U.S. Dept. of Energy 1982; U.S. Office of the Comptroller General 1984, 1981b.

C4.2.2 : Technical Issues

C4.2.2.1 : Health and Environment

Baguk and Nichols 1979; Bayda 1978; British Columbia 1980; Doern 1982, 1978; Doern et al. 1982; Eichholz 1976; Fry and Morison 1982; Jennekens 1980; Ontario 1985, 1981, 1978, 1976; Rohlich and Howe 1981; U.K. Royal Commission on Environmental Pollution 1976, 1972; U.S. Inter Agency Review Group 1979; U.S. Nuclear Regulatory Commission 1979; Williams 1980; Willrich and Lester 1977.

C4.2.2.2 : Safety and Security

Asmis 1981; Australia 1979; Bardach and Kagan 1982; Blewett et al. 1985; Calabresi 1980; Doern and Morrison 1980; Domaratzki 1984; Gorinson 1979; Grange 1980; Harrald et al. 1979; International Atomic Energy Agency 1974; Marcy 1978; Ontario 1981; Pannell and Campbell 1980; Royal Commission on the Ocean Ranger Marine Disaster 1984; Sviridov 1981; U.S. Nuclear Regulatory Commission 1975; U.S. President's Commission on the Accident at Three Mile Island 1979a.

D : Methods of Answering Evaluation Questions

D1 : General Methods of Scholarly Enquiry

Alberta 1985; Anderson 1981; Ash 1971; Aviel 1982; Basuk and Nichols 1979; Beeghly *et al.* 1968; Blewett *et al.* 1985; Borich and Jemelka 1982; Brantingham 1981; Canada Health and Welfare 1984; Chubb 1983; Davis *et al.* 1981; Denton 1977; Doern 1978, 1976; ESSA 1982; Felske and Associates 1981; Flesher and Siewert 1982; Fox 1979; Franson *et al.* 1982; Gibson 1978; Gordon 1980; Gorinson 1979; Grinnell 1982; Hall 1980; Hatry *et al.* 1973; Hyde and Shafritz 1979; I.D. Systems 1984; Ikeda and Winterfeldt 1982; Jackson 1982; Janisch *et al.* 1978; Johnston 1980; Kelman 1981; Law Reform Commission 1975; LGL, ESL, and ESSA 1984; Lucas and Bell 1977; Mills 1978; Muller 1977; Noll 1971; Pannell and Campbell 1980; Patton 1980; Poister 1978; Rees 1980; Reschenthaler 1972; Royal Commission on the Ocean Ranger Marine Disaster 1984; Scarff 1983; Scott and Neher 1981; Sims 1980; Slatter 1982; Stevenson and Thomas 1983; Thierauf 1980; Treasury Board 1985, 1984; U.S. Advisory Council on Intergovernmental Relations 1980; U.S. Dept. of Energy 1982; U.S. National Research Council 1977; U.S. Office of the Comptroller General 1980; U.S. President's Commission on Law Enforcement and the Administration of Justice 1967; U.S. President's Commission on the Accident at Three Mile Island 1979a; Vandervort 1979; Von der Porten 1969; Waverman 1982; Welborn 1977; White 1981; Wilson 1980; Wilson *et al.* 1975; Woods Gordon 1983; Wortman 1983.

D2 : Methods Specific to Discipline or Approaches

D2.1 : Political and Social Sciences

Abert 1979; Australia 1976; Bayda 1978; Beesley *et al.* 1983; Chubb, 1983; Colorado State University 1975; Dewees 1980; Doern 1982, 1979, 1977a and 1976; Doern and Morrison 1980; Doern *et al.* 1982; Ebbin and Kayser 1974; Englehardt and Trebilcock 1981; FEARO 1980 and 1979; Finsterbusch 1980; Fox 1979; Globerman and Rothman 1983; Grinnell 1982; Kaufman and Thomas 1980; Kelly 1982; Law Reform Commission 1980; Matthews 1976; Meyers 1977; Patton 1980; Pois 1979; Poister 1978; Rossi *et al.* 1979; Rutman 1980; SECOR 1984; Slatter 1982; U.S. Advisory Committee on Intergovernmental Relations 1980; U.S. Inter Agency Review Group on Nuclear Waste 1979; U.S. President's Commission on the Accident at Three Mile Island 1979b; Vandervort 1979; Weiss 1972; Welborn 1977; Wholey 1978; Wortman 1983; Zammuto 1982.

D2.2 : Law and Public Administration

Alberta 1985; Australia 1979, 1976; Bayda 1978; British Columbia 1980; Bulmer 1980; Doern 1979, 1978, 1977a and b, 1976; Doern et al. 1975; FEARO 1980, 1979; Gordon 1981, 1980; Gorecki 1981; Gorinson 1979; Grange 1980; Gummer 1982; Hanser 1965; International Nuclear Energy Agency 1983; Kelman 1981; Law Reform Commission 1980, 1977; Leadbeater 1980; Lucas and Bell 1977; Murphy 1981; Nielsen 1985; Ontario 1985, 1978, 1976; Pearse 1982; Posner 1981, 1977; Rhodes 1975; Rohlich and Howe 1981; Royal Commission on the Ocean Ranger Marine Disaster 1984; Saskatchewan 1982; Stanbury 1980, 1978; U.K. Royal Commission on Environmental Pollution 1976, 1972; U.S. Executive Office of the President 1985; U.S. President's Commission on Law Enforcement and the Administration of Justice 1967; U.S. President's Commission on the Accident at Three Mile Island 1979a and b; Vandervort 1979; Waverman 1982; Wolanin 1975; Wraith and Lamb 1971.

D2.3 : Management and Business Methods

Adam and Dogramaci 1981; Brown, D.S. 1971; Colinvaux 1982; Cowing and Stevenson 1981; Dixson 1984; Doern and Maslove 1979; Engstad and Lioy 1980; Ghorpade 1971; Goldhaber 1979; Hall 1982; Information Spectrum 1983; Jackson 1982; Keeling 1972; Lewis 1980; Mazmanian and Nienaber 1979; Mazmanian and Sabatier 1981; Murphy 1981; Ontario 1983; Price 1968; Royal Commission on the Ocean Ranger Marine Disaster 1984; Steiss 1982; Stewart and Garson 1983; Thierauf 1980; U.S General Accounting Office 1984; U.S. National Research Council 1977; U.S. Nuclear Regulatory Commission 1979, 1975; Van de Ven and Ferry 1980; Welborn 1977; Zammuto 1982.

D2.4 : Economics and Accounting

Abert 1979; Beesley et al. 1983; Brantingham 1981; Breyer and MacAvoy 1974; Brown 1971; Calabresi 1970; Canada Office of the Auditor-General 1978; Clark et al. 1980; Cook and Woods Gordon 1981; Courville 1980; Dale-Johnson 1981; Dohan 1977; Economic Council of Canada 1979; Eichholz 1976; Felske and Associates 1981; Ferguson 1981; Fisher 1981; Flesher and Siewert 1982; Gorecki 1981; Hahn 1982; Harrald et al. 1979; Hartle 1978; Hatry et al. 1976, 1973; Jackson 1982; Karam and Morgan 1976; Kernaghan 1983; Knight 1979; Krutilla and Fisher 1975; Lyden and Miller 1978; McCabe 1978; Mills 1978; Nemetz et al. 1981; Organisation for Economic Cooperation and Development 1972; Peters, G.H. 1973; Peters, J.E. 1982; Pois 1979; Poister 1978; Proudfoot 1980; Ray 1984; Rossi et al. 1979; Sarant 1978; Sayle 1981; SECOR 1980; Stanbury 1980, 1978; Steiss 1982; Swartzman et al. 1982; Thierauf 1980; U.S. Department of Energy 1982; U.S. National Industrial Pollution Control Council 1971; U.S. National Research Council 1977; U.S. Office of Science and Technology 1972; U.S. Office of the Comptroller-General 1984, 1981a and b; Wholey 1978; Wortman 1983.

D2.5 : Economic Impact Analysis

Alberta 1979; Brantingham 1981; Breyer and MacAvoy 1979; Britain 1981; Clark *et al.* 1980; Cowing and Stevenson 1981; Dale-Johnson 1981; Dewees 1980; Doern 1979; Economic Council of Canada 1981, 1979; Emmett 1975; Environmental Resources Ltd. 1983; Felske and Associates 1981; Ferguson 1981; Fisher 1981; Freeman *et al.* 1973; Fromm 1981; Gorecki 1981; Hoos 1983; Institute for Energy Analysis 1979; Karam and Morgan 1976; Krutilla and Fisher 1975; Krutilla *et al.* 1978; McCabe 1978; Mills 1978; Pleeter 1980; Richardson 1976; Rossi *et al.* 1979; Scott and Neher 1981; Stanbury 1980; U.S. Council on Environmental Quality 1972.

D2.6 : Science and Engineering

D2.6.1 : Standard-Setting

Basuk and Nichols 1979; Beeghly *et al.* 1968; Doern 1978; Doern *et al.* 1982; Franson *et al.* 1982; Gordon 1980; Hart 1982; Ikeda and Winterfeldt 1982; LeCraw 1981; Leggat 1971; Organisation for Economic Cooperation and Development 1972; U.S. National Research Council 1977.

D2.6.2 : Simulation Modelling and Technical Risk Analysis

Brown 1980; Doern 1982; Domaratzki 1984; Eichholz 1976; Environmental Resources Ltd. 1983; Hoos 1983; Jennekens 1980; Karam and Morgan 1976; Kraft 1982; Limaye 1973; Nemetz *et al.* 1981; Ontario 1981; Reid Crowther and Partners 1980; Rohlich and Howe 1981; Science Council of Canada 1977. U.S National Industrial Pollution Control Council 1971; U.S. Nuclear Regulatory Commission 1979, 1975.

D2.6.3 : Effectiveness of Health, Safety and Environmental Regulation of the Nuclear Industry

Bayda 1978; British Columbia 1980; Brown 1980; Canada Health and Welfare 1984; Doern 1978; Domaratzski 1984; Eichholz 1976; FEARO 1980, 1979; Gilmore 1977; Gorinson 1979; Knight 1976; Ontario 1981,1976; Pannell and Campbell 1980; U.K. Royal Commission on Environmental Pollution 1976; U.S. Atomic Energy Commission 1971; U.S. Inter Agency Review Group on Nuclear Waste 1979; U.S. Nuclear Regulatory Commission 1979; U.S. Office of Science and Technology 1972; U.S. President's Commission on the Accident at Three Mile Island 1979a and b; Williams 1980; Willrich and Lester 1977.

D2.6.4 : Technology Assessment

Burn 1967; Globerman and Rothman 1983; Gorinson 1979; Grange 1980; Kilborn and Beak (no date); Marcy 1978; Miller 1969; Pannell and Campbell 1980; Reid Crowther and Partners 1980; Royal Commission on the Ocean Ranger Marine Disaster 1984; Sviridov 1981; U.S. President's Commission on the Accident at Three Mile Island 1979a and b.

D2.7 : Inspection and Enforcement

Australia 1979; Baker and Meyer 1979; Blewett *et al.* 1985; Chayes and Lewis 1977; Doern 1978, 1976; Engstad and Lioy 1980; Harrald *et al.* 1979; International Atomic Energy Agency 1974; Ishack 1981; Jennekens 1981; Krass *et al.* 1983; Maybee 1984; Muller 1977; Organisation for Economic Cooperation and Development 1977; Royal Commission on the Ocean Ranger Marine Disaster 1984; Scarff 1983; Stevenson and Thomas 1983; Stockholm International Peace Research Institute 1979; U.S. Nuclear Regulatory Commission 1975; U.S. President's Commission on Law Enforcement and the Administration of Justice 1967; Walker and Lonnroth 1983; Wright *et al.* 1981.

E : Integration and Use of Results

E1 : Evaluation in the Context of Program Management

Austin and Associates 1982; Australia 1976; Clark *et al.* 1980; Doern and Maslove 1981; Economic Council of Canada 1979; Hall 1980; Hartle 1978; Hicks 1981; Hyde and Shafritz 1979; Jackson 1982; Jordan and Sutherland 1979; Keeling 1972; Lyden and Miller 1978; Mazmanian and Nienaber 1979; Murphy 1981; Ontario 1982; Rossi *et al.* 1979; Stanbury and Thompson 1982; Steiss 1982; Treasury Board 1981a and b; Wilson 1980; Zammuto 1982.

E2 : Improving the Acceptability and Applicability of Results

Austin and Associates 1982; Borich and Jemelka 1982; Britain 1981; Chubb 1983; Connor *et al.* 1984; Economic Council of Canada 1979; ESSA 1982; Freeman and Solomon 1981; Grinnell 1982; Hall 1980; Hatry *et al.* 1973; Hicks 1981; Hyde and Shafritz 1979; Jackson 1982; Jordan and Sutherland 1979; Laframboise 1983; Mazmanian and Nienaber 1979; Ontario 1983; Palumbo and Nachmias 1983; Patton 1980; Rossi *et al.* 1979; Stewart and Garson 1983; Treasury Board 1981a and b; United States Executive Office of the President 1985; U.S. General Accounting Office 1984; Weiss 1972; Wilson 1980; Zammuto 1982.

CHAPTER III : REVIEW OF THE LITERATURE

PART 1 : INTRODUCTION

A : PURPOSE AND SCOPE OF THE REVIEW

The purpose of this chapter is to identify and review the utility of methods of evaluating regulatory programs and activities with particular reference to the responsibilities of AECB.

Program evaluation is a broad and rather amorphous subject. Its methods tend to be determined to a large extent by its subject. The appropriateness of program evaluation methods for inclusion in this review is therefore largely defined by the nature of AECB's responsibilities.

A1. Types of Regulation

Regulation may be classified by means of its three principal functions. These are the protection of public health and safety and the environment, the control of commerce and trade, and the proper management and control of government funds and property (U.S. Executive Office of the President, Office of Management and Budget, 1985).

The Program Evaluation Branch of our Comptroller General's Office (Treasury Board, 1985) recognizes the first two categories as distinct and includes "fairness" regulation in the first. Fairness regulation includes such matters as product grading, provision of information to the public and certification of the accuracy of weights and measures. The Branch observes that our government's approach to the various components of health, safety and environmental regulation is more or less the same, namely to set standards and to enforce them. Approaches to economic regulation are less homogenous. They include a variety of methods of controlling or intervening in economic activity. The methods reflect a variety of social and economic goals, some of which are conflicting. There is no mention in the Branch's report of the third category of regulation, perhaps because the Branch itself is engaged in just such activity.

The greater part of AECB's activities fall within the health, safety, environment and fairness category. AECB is also subject to regulations concerning the responsible management of public funds. The review therefore tends to focus on these categories.

A2. Types of Regulatory Activity

The Program Evaluation Branch of the Comptroller General's Office (Treasury Board, 1985) recognizes 21 classes of regulatory activity. Five of these are economic : price setting, approval of prices or tariffs, setting output quotas, control of entry to market and import/export controls. AECB is active in the latter two categories, although its activities under those headings are as much concerned with security and public safety as with economic goals. The Branch subdivides standard-setting and enforcement into 12 categories, seven of which concern AECB. These are : the development of standards and guidelines, requirement for the submission of information, project approval, certification, inspection, monitoring and enforcement. Of the Branch's final four miscellaneous categories, AECB is active only in information control. In this review observations and examples relevant to the activities of AECB will be preferred.

A3. Organization of Review

Program evaluation is not a simple one-step process. The large variety of methods in use are appropriate to various parts of the process and operate at various levels of abstraction or detail. They also vary in the aspects of regulation and regulatory activities to which they apply. For this reason we first explain what program evaluation is and describe its component parts. We then follow the sequence of steps required to conduct a comprehensive evaluation, and review methods that might be useful at each stage. As noted before, the perspective of the review is predicated on the perceived needs of AECB.

PART 2. THE REVIEW

A : INITIATING PROGRAM EVALUATION

A1. Definitions of Program Evaluation

A1.1 Historical Origins

Mosteller (quoted in Wortman, 1983) traces evaluation studies back to the Old Testament, but most evaluation textbooks consider "modern" program evaluation a response to the growth in government economic intervention and social welfare programs that began during the Great Depression of the thirties. That growth led people to question the wisdom of governmental intervention and the efficiency and effectiveness of increased public spending. The development of program evaluation as a discipline began in the United States and that country has continued to lead in the variety and volume of evaluation practice. The bulk of evaluation effort has been devoted to social, including education and health, programs.

Modern program evaluation is an offshoot of Planning, Programming Budgeting Systems (PPBS) and policy analysis methods of the sixties (Hyde and Shafritz, 1979; Lyden and Miller, 1978). PPBS included four steps that are essential to program evaluation : (i) clear definition of program objectives; (ii) determination of where funds and labour are being expended; (iii) definition of possible alternative policies or programs; and (iv) gathering data and bringing it to bear on the making of management decisions. Hyde and Shafritz (loc. cit.) observe that while PPBS emphasizes planning, program evaluation is oriented towards retrospective examination :

> "It is conceived of as a method of measuring programs for efficiency, effectiveness and relevance (or appropriateness) by defining program objectives and measuring program outputs against goals and standards".

The origins of program evaluation in the Canadian public service were similar, both in terms of need and in terms of the financial management system into which evaluations were to be incorporated (Hartle, 1978). The Treasury Board Guide to Evaluation (1981a) notes that American, as well as Canadian experience was drawn on in preparing the 1977 policy paper that first introduced systematic program evaluation to the federal public service. The Guide also notes that the emphasis in Canada is firmly on providing "aid to decision-making and management" rather than "determining scientifically whether or not a program has a particular effect".

A1.2 Definitions of Program Evaluation

The difference in emphasis in program evaluation between Canada and the United States appears less evident in the following typical definitions.

Comptroller-General of Canada in Treasury Board Guide (1981a) :

> "Program evaluation is the periodic, independent and objective review and assessment of a program to determine, in light of present circumstance, the adequacy of its objectives, its design and its results both intended and unintended. Evaluations will call into question the very existence of the program. Matters such as the rationale for the program, its impact on the public, and its cost-effectiveness as compared with alternative means of program delivery are reviewed."

Hyde and Shafritz (1979) :

> " ... the systematic examination of (program) activities to make a determination about their impact or effects, both long and short range. A program evaluation should be distinguished from a management audit or an organization evaluation because these are limited to concentrating on a program's internal administrative procedures. While program evaluations will use

> information such as workload measures, staffing levels or operational procedural data, the main thrust is necessarily on overall program objectives and impact".

The difference is, in fact, more apparent than real. Most authorities define program evaluation by means of the kinds of questions it poses and, when these are examined, we see that the full range of questions is addressed by workers in both countries. If there is a difference, it is in the perspective from which evaluation is approached. In Canada, much evaluation of government programs is from an internal or public service perspective. It tends to concentrate on efficiency in reaching program objectives. In the United States there is more emphasis on accountability to the public and an external perspective is more common.

The following examples of a definition of program evaluation by means of the questions asked makes its real objectives clear :

Poland (in Hyde and Shafritz, 1979) :

> " How well has the program been administered ?
>
> Did it achieve its objectives ?
>
> To what extent ?
>
> Is it worth doing ?
>
> Has it been done well ?
>
> And at what cost ?"

The Treasury Board Guide (1981a) is more formal but covers much the same ground :

> "To what extent are the objectives and mandate of the program still relevant ?
>
> Are the activities and outputs of the program consistent with its mandate and plausibly linked to the attainment of the objectives and the intended impacts and effects ?
>
> What impacts and effects, both intended and unintended, resulted from carrying out the program ?
>
> In what manner and to what extent does the program complement, duplicate, overlap or work at cross-purposes with other programs ?
>
> In what manner and to what extent were appropriate program objectives achieved as a result of the program ?

> Are there more cost-effective alternative programs which might achieve the objectives and intended impacts and effects ?
>
> Are there more cost-effective ways of delivering the existing program ? "

The focus of evaluation of public service programs therefore should be on efficiency and effectiveness in achieving program goals and on whether the goals are worth achieving. This simple statement distinguishes program evaluation from auditing which traditionally concerns itself with control and compliance : i.e. ensuring that public funds are accounted for and disbursed in accordance with the law and in an appropriately parsimonious manner. However this distinction is becoming blurred as auditors expand their activities beyond the traditional to such matters as "value-for-money" auditing.

Variations on a Theme

Perhaps the first general conclusion of this review is that nothing about program evaluation is as simple as it seems. The definition outlined above, while somewhat imprecise by scientific standards, seems clear enough. When it is reinterpreted to fit the purposes of the various parties with an interest in a program, or to fit the philosophical or technical approaches of the various intellectual disciplines that participate in evaluations, its clarity is easily overlooked. The range of these variations on the evaluation theme will become evident to the reader of this review.

A2. Usefulness of Program Evaluation

Because of attempts, often successful, to bend the design and results of evaluations to support political or other bargaining positions and to force evaluation methods to conform to the precepts of particular disciplines, some workers have come to doubt not only its efficacy but its basic concepts (Palumbo and Nachmias, 1983; Zammuto, 1982). Such objectors conclude that : "objective" or "value-free" evaluation is impossible. This may be true, but evaluation results can still be useful if the values and perspectives of both evaluator and commissioner of evaluation are made clear so that the results may be interpreted with them in mind.

A more practical objection to the practice of evaluation is the suggestion that its results are unusable. For example, Dobell and Zussman (in Hicks, 1981) document a fairly general disappointment with the results of program evaluation in the Canadian public service. They suggest two explanations : that methods used to date are more appropriate to the private sector and not readily transferable to public programs; and that there is a natural resistance to evaluation among public service managers. Significantly they suggest that an external perspective would improve results. The American literature includes many references to the difficulties of applying the results of evaluations and the resistance to evaluation displayed by those with a stake in the undisturbed continuation of a program (Berry, 1982; Connor *et al.*, 1984). Most authors do not suggest that these difficulties are insurmountable in the United States or Canada. They do indicate that integration and implementation of evaluation results is a topic in need of attention. It will be reviewed separately.

A3. Where Evaluation Fits in the Management of Government Services

The Treasury Board Guide (1981a) explains in great detail where program evaluation fits into the management of the Canadian public service. Evaluation is presented as an exclusively internal matter with no reference to participation by legislators, or by the public served or affected by the program at issue. It is also represented as a more or less discrete activity within public service management. The Guide does, however, identify the points at which decisions about what to evaluate may derive from other management functions and the points at which results of evaluation reenter the management system. This impression of distinctness is somewhat misleading because evaluation type information has been included in the past at a number of points in the existing process of budgeting and reporting to Parliament. For example in Part III of the Main Estimates, Departments and Agencies, including AECB, provide information about resources needed and used to meet program objectives. Evaluative information also appears in the Auditor General's report to Parliament. More recently Departments have provided evaluative data to the Nielsen task forces (Nielsen, 1985).

Hartle (1978) and Doern and Maslove (1979) review Canadian Government management practice in general and Schultz (in Kernaghan, 1983) reviews it in relation to regulation. Jackson (1982) compares American, British and Australian methods of management and control of government programs. There is some comparative description of audit, including comprehensive audit, functions in many countries including Canada in Wilson, Belanger and Campbell (1975).

Not all evaluation of Canadian government programs is internal or internally commissioned. There is evaluation by House of Commons and Senate committees, although it is not usually of a formal nature. There are more formal program evaluations undertaken by or for legislators, such as the component studies of the "Regulation Reference" by the Economic Council of Canada (ECC, 1981; 1979), studies of independent regulatory agencies by the Law Reform Commission (e.g. Law Reform Commission, 1980), the work of the Nielsen

(1985) task forces and the surveys done for the Government Caucus in Alberta (Alberta 1985). There have also been evaluations by or for interest groups such as the Consumers Association of Canada (Reschenthaler, 1972) and the Canadian Arctic Resources Committee (Rees, 1980). External evaluations in Canada are commissioned on an ad hoc basis in response to perceived needs or political agendas. The only evaluations conducted on a systematic continuing basis are internal.

In Australia (Australia, 1976) and the United Kingdom (Keeling, 1972; Jackson, 1982), the status of program evaluation is much as in Canada. In the United States it is different. The separation of powers in the U.S. constitution has led to the establishment of more or less continuous evaluation programs to serve the needs of both executive and legislative branches. Because these branches are more conscious of their distinctness than their counterparts in Canada and the rivalry between them is stronger, evaluation tends to be used to support positions in the consequent struggle. Legislators suspect that internal evaluations are designed to support the continuation or expansion of programs favoured by the executive branch or to protect the interests of those employed by those programs. In return public servants and executive branch staff suspect that evaluations by or for legislators are ideologically biased. This tension leads to a healthy scepticism on all sides and to methodological debate that can only improve the objectivity of evaluations (Weiss, in Hyde and Shafritz, 1979; Wortman, 1983; Palumbo and Nachmias, 1983; Connor et al., 1984). It also means that internal evaluation reports are more publicly accessible than in most other countries.

Public service management in general in the United States, and the place of program evaluation and related exercises in such management, are dealt with in detail by Lyden and Miller (1978), Pois (1979) and Steiss (1982).

A4. Steps in Program Evaluation

Most textbooks or general articles on evaluation (e.g. Austin and Associates, 1982; Borich and Jemelka, 1982; Connor et al., 1984; Rutman and de Jong, 1976; and Rutman, 1980) and our Treasury Board publications (1981a and b, 1985) break down evaluation into as many as seven steps. The first and last are often not considered part of evaluation proper. The first step is the commissioning of evaluation in which the context, perspective and objectives are usually defined by the person or group for whom the evaluation is to be prepared. The last step is the incorporation of evaluation results into program management, or their other use, by whoever commissioned the evaluation.

Evaluation itself begins with a detailed description of the program to be evaluated and proceeds to use this description to identify issues for evaluation. There is an element of selection here because the number of possible issues is normally very large and most evaluations deal with only a few of them. In the next step, specific questions are defined that enable exploration of the issues. These two steps are grouped by Treasury Board and many other authorities as "Evaluation Assessment". Evaluation assessment includes the determination of evaluability, i.e. the extent to which the questions can be answered.

Treasury Board groups the next two steps under "Actual Evaluation". The steps are : (i) answering the questions; and (ii) integrating the answers into an analytical response to the evaluation issues. The final step in evaluation proper is the drafting of recommendations based on evaluation results for consideration by program managers or other commissioners of evaluation. The steps which follow answering the questions are often grouped under :"Integration and implementation".

A5. Commissioning Evaluations

The commissioning of evaluation is not only the first step in the process but, in many ways, the most important. It defines, or should define, the context, perspective and scope of an evaluation. Above all, the person or group commissioning the evaluation can do a great deal to influence its objectivity, if that be a desirable goal. The Treasury Board paper (1984) on evaluation of R & D programs discusses many of these issues.

The Treasury Board Guide (1981a) makes it clear that, in the Canadian public service, the Deputy Head has the ultimate responsibility for commissioning evaluation and is the eventual "client" of evaluators. This arrangement has been criticised by authors such as Dobell and Zussman (in Hicks, 1981) and Jordan and Sutherland (1979) because it tends to limit the scope of evaluation. It is suggested that major decisions about, for example, program termination, are likely to be beyond the power of the Deputy Head and therefore are not likely to be selected as evaluation issues. Similarly, public servants in general are likely to regard government programs and their continuation as desirable. The perspective of evaluations commissioned by them is likely to be influenced by this opinion.

While these criticisms are rationally based, it is fair to observe that analagous reservations can be held about the perspectives of evaluations commissioned by other groups (Borich and Jemelka, 1982; Zammuto, 1982). Every evaluation has a political context and a political stance, conscious or otherwise (Weiss, in Hyde and Shafritz, 1979). An illustrative example is provided by the United States

Executive Office of the President (1985). Sometimes the perspectives of evaluations reflect national differences (Cairns, 1980) or interest group (Reschenthaler, 1972) or discipline (Science Council of Canada, 1982; Law Reform Commission, 1980) priorities.

The subject of values in evaluation is one of active debate (Borich and Jemelka, 1982; Vickers, 1980; Laframboise, 1983; Scriven, in Connor et al., 1984) and must be taken into account in the commissioning of evaluation and the interpretation of its results.

A6. Some General References

It is appropriate at this point in the review to mention a number of guides to, and textbooks of, evaluation that cover most or all of the subject. Of principal interest to AECB are the Treasury Board Guide (1981a) and Principles (1981b), its guide on evaluation of federal R & D programs (1984), and its draft paper on evaluation of regulatory programs (1985). The paper by Rogers in Hicks (1981) is in the same vein. Hatry et al. (1976, 1973) are simple guides to evaluation of American public service programs.

There are a large number of textbooks of program evaluation, a selection of which are abstracted in the bibliography. Rutman (1980) and Rutman and de Jong (1976) are Canadian texts. They deal mainly with evaluation assessments and evaluability, but are useful because they deal extensively with Government of Canada programs. Other evaluation texts are Austin and Associates (1982), Borich and Jemelka (1982), Grinnell (1982), Kaufman and Thomas (1980), Mazmanian and Sabatier (1981), Murphy (1981), Patton (1980), Poister (1978), Rossi, Freeman and Wright (1979), Weiss (1972), and Wholey (1978). Adam and Dogramaci (1981), Flesher and Siewert (1982), Sayle (1981), Thierauf (1980), Van der Ven and Ferry (1980) and Zammuto (1982) deal with efficiency audit or organizational analysis methods, both of which overlap program evaluation to a significant extent.

Several books include selections of papers covering the field of program evaluation and are useful as general texts. These include Freeman and Solomon (1981), Hicks (1981), Connor et al. (1984) and Hyde and Shafritz (1979). Also of general interest are the contents of the Evaluation Review Annuals and the professional journals that cover program evaluation and related topics. Canadian Public Administration is the most relevant Canadian journal.

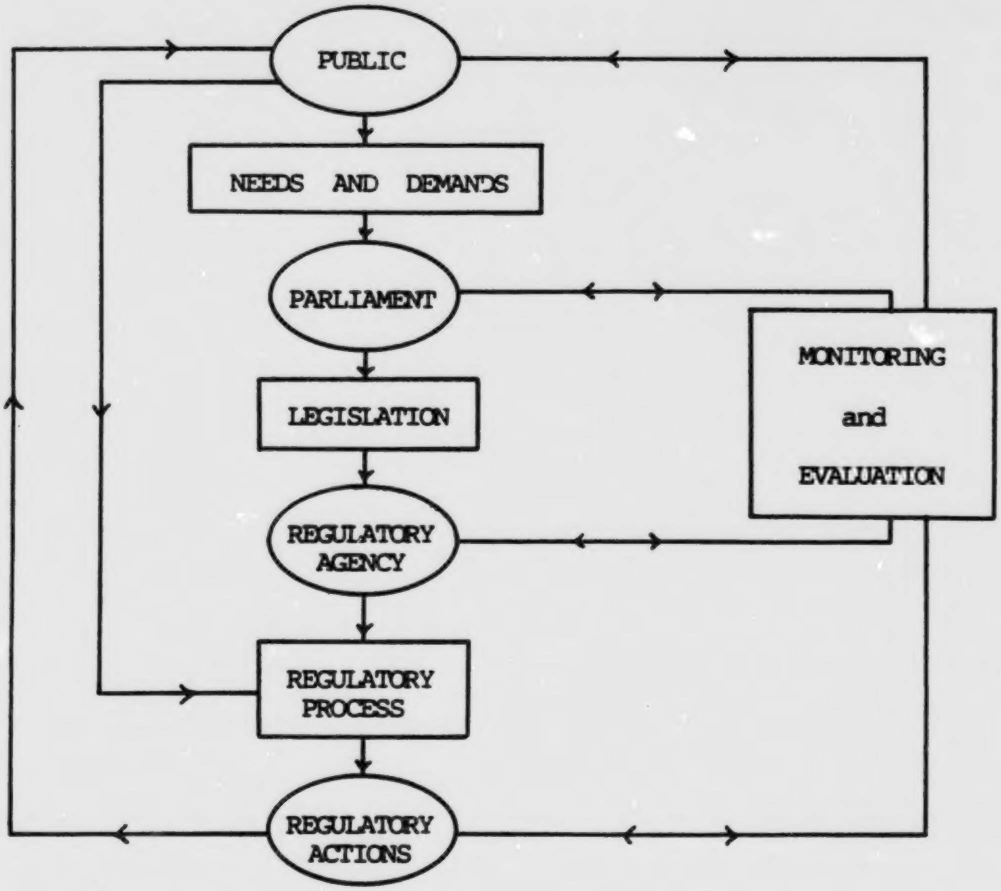

PUBLIC
NEEDS AND DEMANDS
PARLIAMENT
LEGISLATION
REGULATORY AGENCY
REGULATORY PROCESS
REGULATORY ACTIONS
MONITORING and EVALUATION

Figure 1: General Model of Regulation

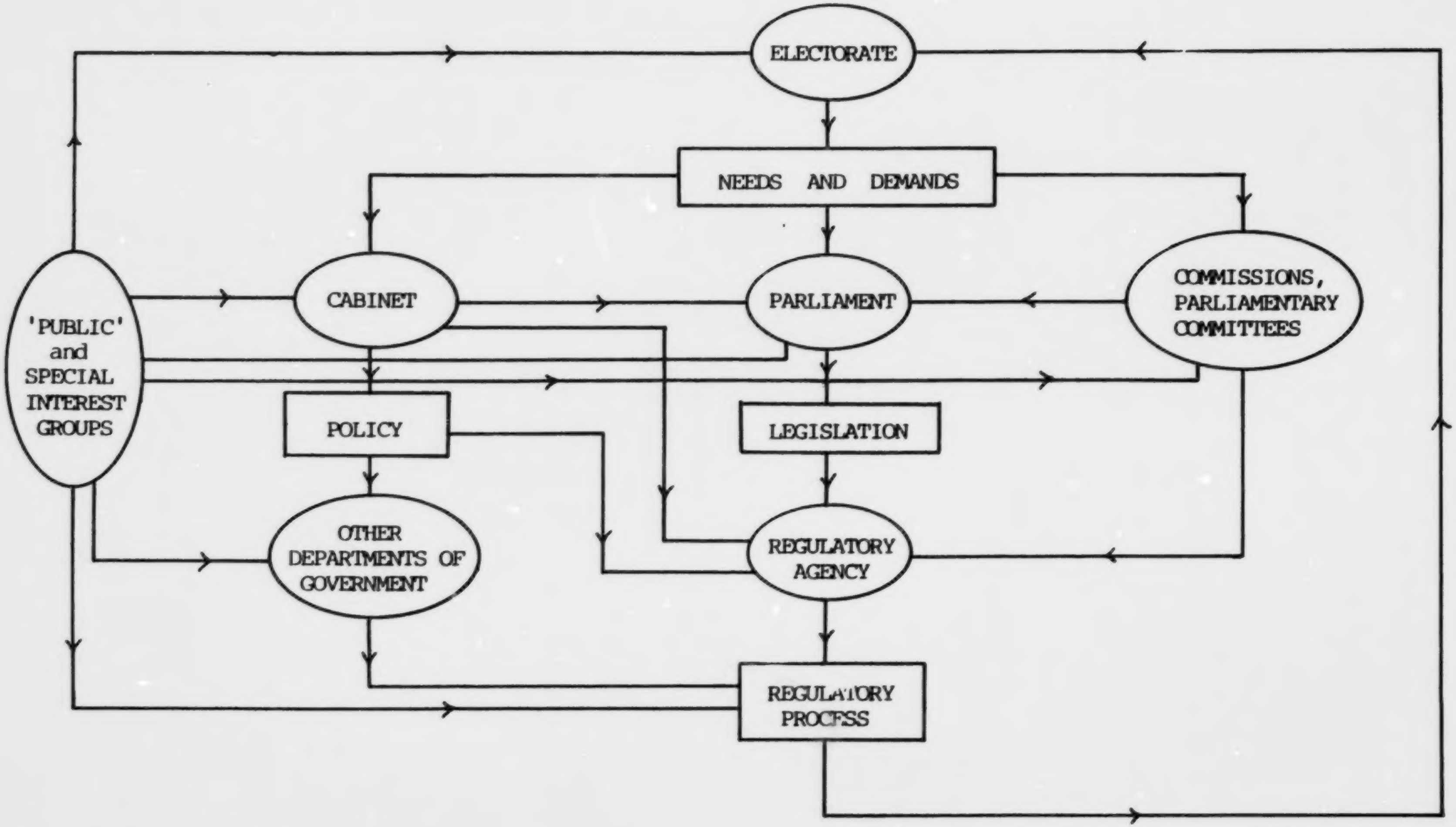
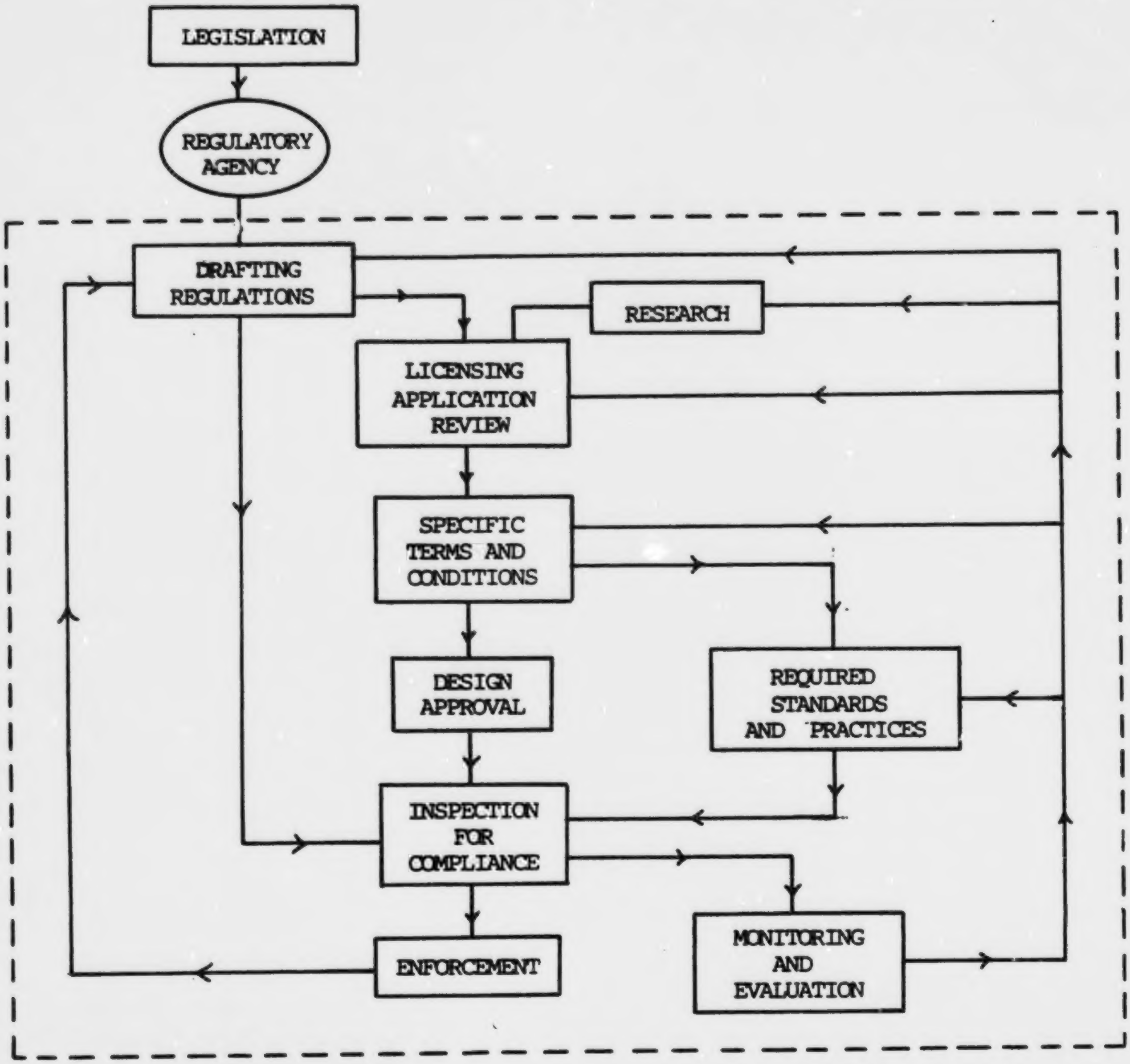

ELECTORATE
NEEDS AND DEMANDS
CABINET
PARLIAMENT
COMMISSIONS, PARLIAMENTARY COMMITTEES
'PUBLIC' and SPECIAL INTEREST GROUPS
POLICY
LEGISLATION
OTHER DEPARTMENTS OF GOVERNMENT
REGULATORY AGENCY
REGULATORY PROCESS

Figure 2: The Political Process of Regulation

Figure 3: The Regulatory Process


LEGISLATION
REGULATORY AGENCY
DRAFTING REGULATIONS
RESEARCH
LICENSING APPLICATION REVIEW
SPECIFIC TERMS AND CONDITIONS
DESIGN APPROVAL
REQUIRED STANDARDS AND PRACTICES
INSPECTION FOR COMPLIANCE
ENFORCEMENT
MONITORING AND EVALUATION

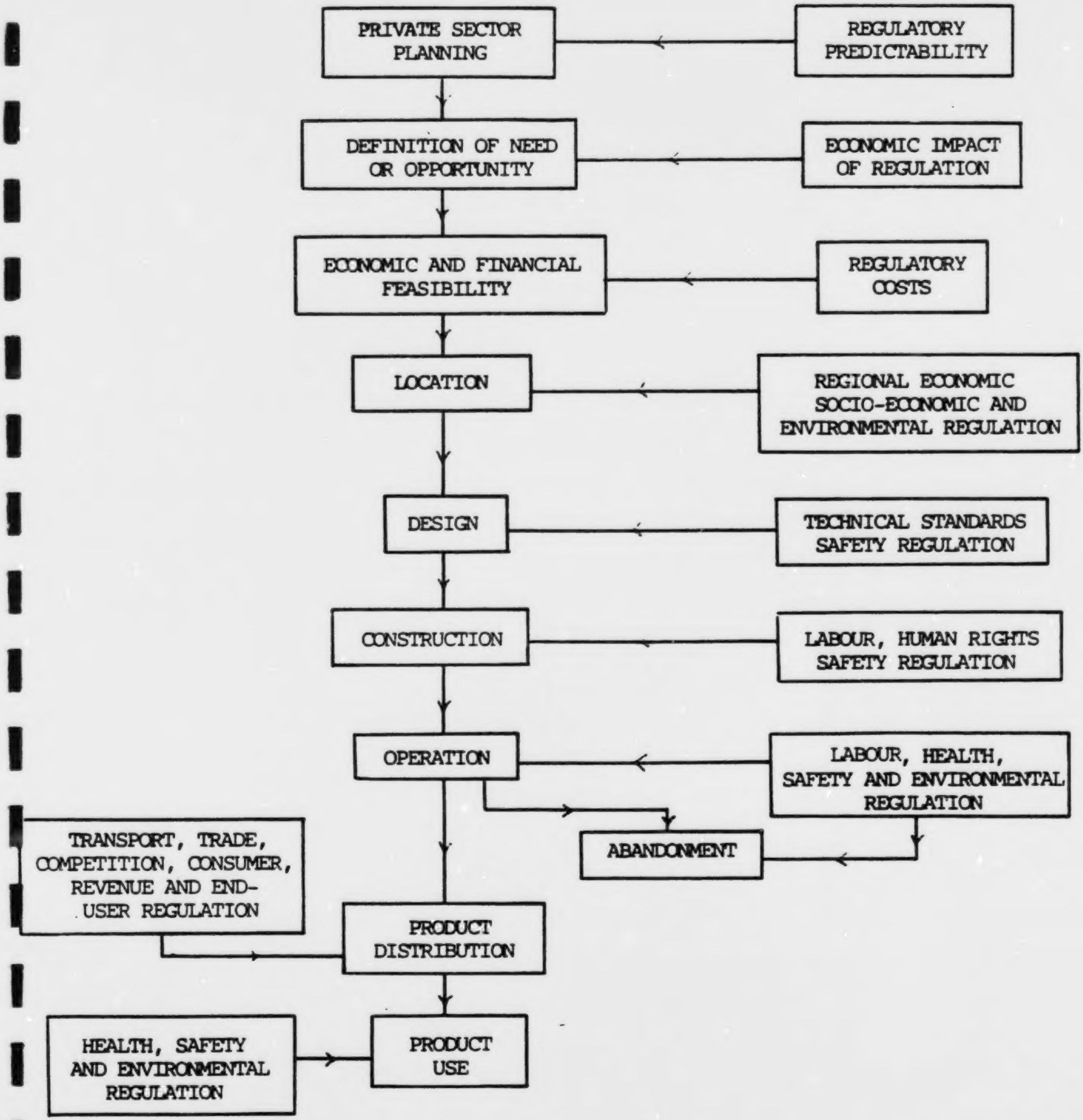
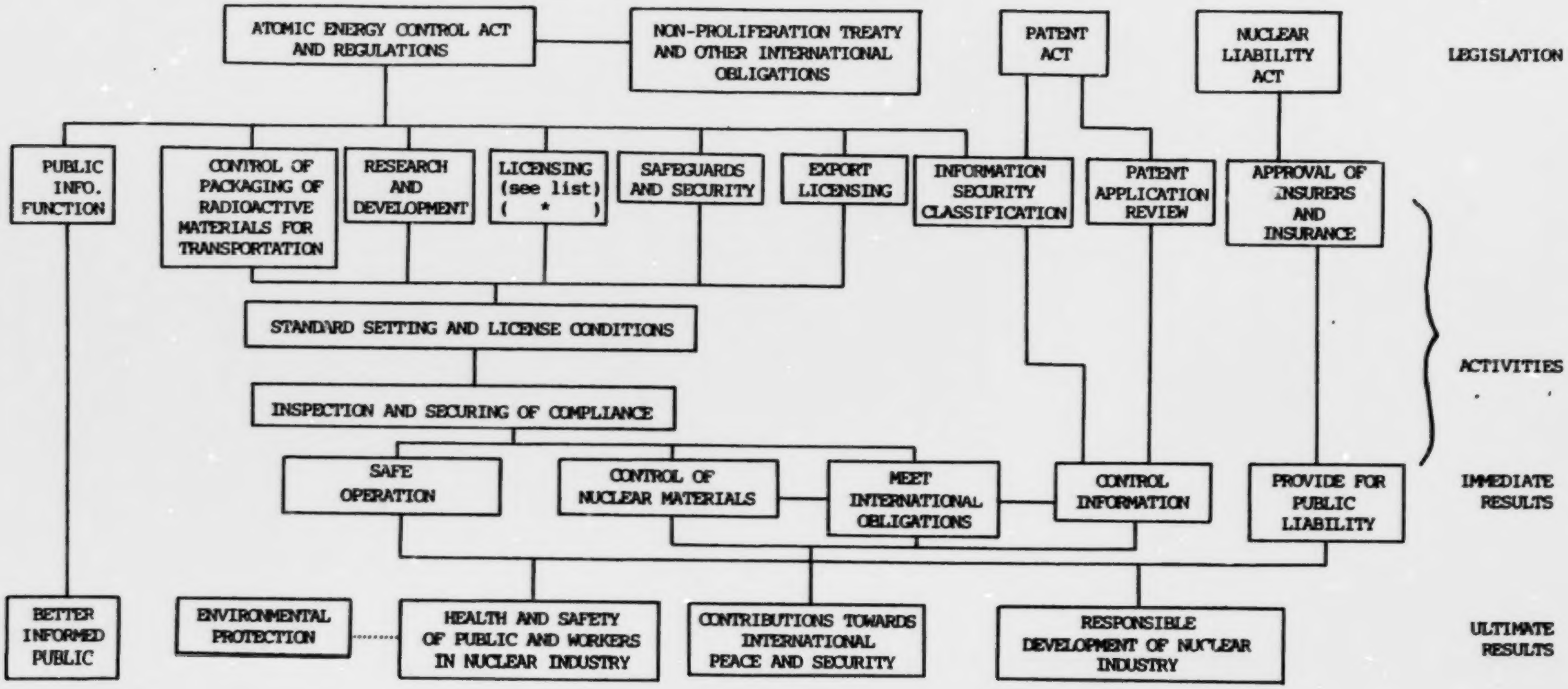

PRIVATE SECTOR PLANNING
REGULATORY PREDICTABILITY
DEFINITION OF NEED OR OPPORTUNITY
ECONOMIC IMPACT OF REGULATION
ECONOMIC AND FINANCIAL FEASIBILITY
REGULATORY COSTS
LOCATION
REGIONAL ECONOMIC SOCIO-ECONOMIC AND ENVIRONMENTAL REGULATION
DESIGN
TECHNICAL STANDARDS SAFETY REGULATION
CONSTRUCTION
LABOUR, HUMAN RIGHTS SAFETY REGULATION
OPERATION
LABOUR, HEALTH, SAFETY AND ENVIRONMENTAL REGULATION
ABANDONMENT
TRANSPORT, TRADE, COMPETITION, CONSUMER, REVENUE AND END-USER REGULATION
PRODUCT DISTRIBUTION
HEALTH, SAFETY AND ENVIRONMENTAL REGULATION
PRODUCT USE

Figure 4: Regulation As Seen By The Regulated

Figure 5: Tentative Logic Diagram for AECB Program.


ATOMIC ENERGY CONTROL ACT AND REGULATIONS
NON-PROLIFERATION TREATY AND OTHER INTERNATIONAL OBLIGATIONS
PATENT ACT
NUCLEAR LIABILITY ACT
LEGISLATION
PUBLIC INFO. FUNCTION
CONTROL OF PACKAGING OF RADIOACTIVE MATERIALS FOR TRANSPORTATION
RESEARCH AND DEVELOPMENT
LICENSING (see list) (*)
SAFEGUARDS AND SECURITY
EXPORT LICENSING
INFORMATION SECURITY CLASSIFICATION
PATENT APPLICATION REVIEW
APPROVAL OF INSURERS AND INSURANCE
STANDARD SETTING AND LICENSE CONDITIONS
INSPECTION AND SECURING OF COMPLIANCE
ACTIVITIES
SAFE OPERATION
CONTROL OF NUCLEAR MATERIALS
MEET INTERNATIONAL OBLIGATIONS
CONTROL INFORMATION
PROVIDE FOR PUBLIC LIABILITY
IMMEDIATE RESULTS
BETTER INFORMED PUBLIC
ENVIRONMENTAL PROTECTION
HEALTH AND SAFETY OF PUBLIC AND WORKERS IN NUCLEAR INDUSTRY
CONTRIBUTIONS TOWARDS INTERNATIONAL PEACE AND SECURITY
RESPONSIBLE DEVELOPMENT OF NUCLEAR INDUSTRY
ULTIMATE RESULTS

Footnotes

1. * LICENSING LIST

Nuclear Activity Licensing - Reactors, accelerators, heavy water plants, Uranium and Thorium mines and mills, refineries and fuel fabrication plants, and waste management facilities.

Nuclear Material Licensing - Possession and use of Uranium, Thorium and heavy water.
- Radioisotope licenses.

N.B. "Licensing" includes contact with licensees and technical assessment activities.

2. The Board also assists other departments in administration of acts which may bear on possession or use of radioactive substances not covered under the A.E.C. Act e.g. Radiation Emitting Devices Act and Transportation of Dangerous Goods Act (AECB 1983).

B : THE DESCRIPTIVE STEP

Evaluation requires an accurate description of a program. The description should include, with the rationale and objectives of the program, its basis in legislation and policy, the process by which it achieves its objectives, the resources it uses to achieve them, its involvement with other agencies and groups and the ascertainable effects of its activities. In short, the description should be comprehensive.

The purpose of such a comprehensive description is to ensure that no issues for evaluation are overlooked. A comprehensive description enables the identification of all possible issues. A selection of issues for evaluation can then be made from the complete set.

B1. Textual Descriptions and Descriptive Models

Most descriptions of regulatory programs that are available in the literature are textual. Some workers use descriptive models ranging from simple flow charts or "logic diagrams" to formal systems models. There is a tendency to assume that the difference between these methods of description is fundamental. It is not. Descriptive models are simply a way of organizing information to improve intelligibility and to identify relationships. Any author writing a textual description of a program has a descriptive model in mind, even if he never makes it explicit. The nature of the model is usually evident from the organization of the text under various headings. Models help to clarify thoughts about the program being described and are of particular assistance to visual thinkers.

B2. A General Model of Regulation

Figure 1 (page 194) presents a simple descriptive model of regulation. The creation of regulation begins with the public which expresses a demand for regulation of an activity. This demand may be expressed directly to elected representatives or may be brought to their attention in other ways. Parliament may enact legislation in response to the demand. The legislation may create a new regulatory agency or empower an existing agency to implement, and in some cases enforce, provisions of the legislation. This is achieved by a regulatory process that is usually developed by the regulatory agency, although it may be specified in part by the legislation. The product of the regulatory process is regulation itself : "output" in economic terminology. The output is intended to satisfy the demand which initiated the chain of events we have just described. Members of the public will be affected by regulation regardless of whether it satisfies the demand that gave rise to it.

The place of evaluation in this sequence of events is to enable Parliament, the public and managers within regulatory agencies or departments to determine whether objectives are being met and demands satisfied.

This simple model is already useful to commissioners of evaluation in helping them focus their attention on parts of the chain that concern them most, or for which they are directly responsible. It is also useful to evaluators as a reminder of what to include in descriptions and as a basis for comparison of different regulatory programs. A disadvantage of using models becomes apparent if an evaluator attempts to force a program description to conform to an inappropriate model.

B3. Properties of Descriptive Models

There are two properties of descriptive models that are very useful to evaluators. One is that the links between the elements of the model refer to actions or activities that are suitable for, and usually susceptible to, evaluation. To illustrate : the first vertical link in the general model refers to how the public expresses its demands. This might cause an evaluator to ask how effectively the public is able to articulate and to express its demands and whether government is providing appropriate opportunity for it to do so. United States Advisory Committee on Intergovernmental Relations (1980) examines exactly this question.

The second is that the elements of models are essentially hierarchical in nature. They can be broken down into smaller elements which, in turn, have links between them. This basic proposition of systems theory has been expanded into a popular philosophy by the late Arthur Koestler. Its origins can be traced to the natural philosophy of Leibnitz. For an evaluator this property is useful in expanding the detail in a program description in a coherent and intelligible manner and in breaking broad evaluation issues into more precise and perhaps more answerable questions.

The next level of detail below the general model of Figure 1 is illustrated in Figures 2 and 3 (pages 195 and 196). These somewhat more detailed models are useful in identifying exactly what are the key evaluation issues in a given program. There is however a limit to the attraction and usefulness of this refinement. It is possible to continue the hierarchical breakdown to the level of minutiae, a criticism that accountants conducting audits are accustomed to hearing. At some point one must choose an appropriate level of resolution that is consistent with the objectives of any particular evaluation and yet allows the essential questions to be identified.

The descriptive models recommended in the Treasury Board Guide (1981a) are referred to as logic diagrams. They are a simplified form of systems model approached from a more-or-less economic perspective. As can be seen from Figure 5 (page 198), emphasis is on program activities and effects rather than on process. The importance of perspective is illustrated by a comparison of Figures 4 and 5 . Figure 4 (page 197) shows a regulatory process from the point-of-view of the regulated; Figure 5 reflects the view of the regulator.

A second group of methodological references is not overtly concerned with modelling, but rather attempts to define frameworks for comparative analysis of regulatory programs and processes. In some cases, this exercise was undertaken to provide a common basis for a series of studies of regulation. The Regulation Reference of the Economic Council of Canada (ECC, 1981, 1979; and Cairns, 1980) is one example, and the series of papers on independent regulatory agencies by the Law Reform Commission (Law Reform Commission, 1980) is another. Work sponsored by the Institute for Research on Public Policy (Stanbury, 1980, 1978; Stanbury and Thompson, 1982) also offers a framework in a Canadian context and contrasts this with the United States. Brown-John (1976), Doern et al. (1975), Berry (1982) and Mitnick (1982) also attempt to provide conceptual frameworks for analysis and evaluation of regulation.

Finally there are a number of comparative studies of regulation that develop descriptive frameworks in the course of producing descriptions. They vary in the degree to which this is made explicit. Brantingham (1981), Doern (1979), Franson et al. (1982), and Reschenthaler (1972) are Canadian examples. International Nuclear Energy Agency (1983), Kelman (1981), the Royal Commission on the Ocean Ranger Marine Disaster (1984), Welborn (1977) and Wilson (1980) offer American examples or international comparisons.

B4. Relevant References in the Bibliography

There are two kinds of references in the bibliography that are useful in preparing descriptions of regulatory programs for evaluative purposes. The first kind is methodological and the second is actual examples of descriptions made by evaluators. Some papers include both.

B4.1 Methodological References

There is a vast literature on systems modelling that is too extensive to include in this report. There are some publications that are specifically relevant and worthy of mention. The book by Borich and Jemelka (1982) provides a comprehensive account of the use of modelling in evaluation :

> "If we had a way to conceptualize a program such that we could simultaneously see the program's component parts and view the program as a component part of some larger system, we could perhaps gain a conceptual handle on the complexity inherent in that program.....We will then use (these) models to pose questions about the program."

They also show how the most important elements and links in models, and hence the most important evaluation questions, can be identified. The book includes a variety of approaches to constructing descriptive models. Each provides the basis of a different approach to conducting evaluations. These approaches reflect the priorities and perspectives of different commissioners of evaluation.

Hoos (1983) provides a useful counterweight to Borich and Jemelka (1982) in that it explores the weaknesses of systems modelling and its application. ESSA (1982) discusses the use of a systems approach to environmental assessment in a Canadian context. In doing so, it deals with a broad range of environmental regulation and offers useful advice to evaluators of regulatory programs.

B4.2 Examples of Descriptions

In addition to the examples mentioned in the last paragraph there are many references that include descriptions of regulatory programs that are of potential value to an evaluator of AECB's work.

AECB staff themselves have published many descriptions of AECB's program. Jennekens (1981, 1980), Hamel (1981) and Sims (1980) deal with the entire scope of AECB activity while Asmis (1981), AECB (1983), Dory (1982), Domaratzki (1984), Gummer (1982), Ishack (1981), Marchildon (1983) and Joyce (1981) deal with parts of it. AECB has also published reports by SECOR (1984, 1980) that cover parts of its activities. Doern (1976) has also published a number of papers on AECB's programs.

There are a number of papers describing regulation of the nuclear industry in other countries. Penelle (1985) describes nuclear regulation and standard-setting in Belgium. Staff of the U.S. Nuclear Regulatory Commission (1985), and Scarano and Linehan (1979) are reports similar to those by AECB staff published by AECB's American counterpart. Other examples are the International Nuclear Energy Agency (1983) mentioned above, Gorinson's (1979) report on the Three Mile Island incident, Muller and Associates (1977) on the U.S. Nuclear Regulatory Commissions's Quality Control Program, Stevenson and Thomas (1983, 1982a and b) comparing U.S. and foreign licensing and safety procedures, and the U.S. Inter Agency Review Group (1979) and Willrich and Lester (1977) on radioactive waste.

The bibliography includes many other papers which describe regulatory programs. Those specifically prepared for Treasury Board style evaluations are in I.D. Systems (1984) and Smith (1982). The largest body of descriptions is to be found in the Economic Council of Canada Regulation Reference series. Anderson (1981), Dale-Johnson (1981), Felske and Associates (1981), Gorecki (1981), Nemetz et al. (1981), Nix and Clayton (1980), Peters (1982), Priest (1982), Proudfoot (1980), Rohlich and Howe (1981), Scott and Neher (1981), and Trebilcock et al. (1982) are the most relevant examples. Dale-Johnson (1981) discusses some of the difficulties of forcing a program description to fit a predetermined model. In the Law Reform Commission series on administrative law and on independent regulatory agencies Doern et al. (1975), Fox (1979), Janisch et al. (1978), Johnston (1980), Leadbeater (1980), Lucas and Bell (1977), Slatter (1982) and Vandervort (1979) are particularly useful. The Law Reform Commission working paper (1980) is the most useful and is more comprehensive than its final report (1985), which concentrates on recommendations rather than analysis.

Other Canadian examples of some interest are Gibson's (1978) case study of a regulatory approval which deals mainly with DIAND, Leggat's (1971) paper on standard-setting, Cottrell (1980), Doern (1977b) and Reid Crowther and Partners (1980) on regulation of hazardous waste and Doern et al. (1982) on health and safety regulation and implementation in Ontario. Quebec (1985) and Saskatchewan (1984) describe provincial regulatory programs. American examples include Breyer and MacAvoy (1974) on the Federal Power Commission, the U.S. National Research Council (1977) on the Environmental Protection Agency, and the U.S. Executive Office of the President, (1985) on the entire U.S. regulatory program. Pois (1979) describes the program of the U.S. Comptroller General's office in a manner similar to that of the Law Reform Commission. The reader is also referred to the examples of comparative descriptions given in the previous section.

Examples of Most Relevance to AECB's Program

The references to methods of description and descriptive modelling are potentially useful to an evaluator of AECB's programs. How useful each reference is will depend on the approach to evaluation specified by AECB or selected by the evaluator. The report by I.D. Systems (1984) is the best example we have seen within the Treasury Board system.

Papers describing AECB's programs are obviously vital and descriptions of other nuclear regulatory programs are of some use. Of these Gorinson (1979) and International Nuclear Energy Agency (1983) may be most useful. In the Canadian literature the Law Reform Commission Working Paper (1980) and Doern's work (1977b) are among the most useful.

C : DEFINING QUESTIONS

Evaluators seek to identify important evaluative issues and to pose specific answerable questions to illuminate those issues. It is desirable to keep the number of important issues and questions within reasonable bounds, but in order to discover what the issues are, and to formulate the necessary questions, the consideration of a much larger number of issues and questions is usually unavoidable. Key issues are selected from such a larger group. The process of proceeding from a relatively small number of "generic" issues to a large number of specific issues or questions, and back to a smaller number of actual questions for evaluation is illustrated by Treasury Board in its draft paper on regulatory programs (1985). Most references in the bibliography include at least some illustration of this process. Some papers discuss the process of issue identification and question selection. Others offer lists of questions and issues. Some simply illustrate their methods by reporting on their evaluation.

C1. Limiting the Search

It is possible to place limitations on the search for issues if the scope, context and perspective of the evaluation are specified by its commissioner or are, in any case, well understood. The importance of establishing these was touched on in the previous section of this report. The position (internal or external) and responsibilities of the commissioner of the evaluation, the values he or she espouses, his or her professional discipline and any superimposed framework of evaluation (such as the Treasury Board Guide) all play a part in determining what are appropriate items of attention in an evaluation.

Figures 2-5 (pages 195-198) are generalized descriptive models that illustrate different approaches to program description and issue identification in evaluations. Figures 2 and 3 represent approaches that might be taken by non-participants in the regulatory process; Figures 4 and 5 represent "internal" approaches that may be taken by the regulators and the regulated. The figures also illustrate other differences in perspective. Figures 2 and 3 are very much concerned with process and readily generate questions about whether regulatory actions are being carried out efficiently and in accordance with ethical or political principles. This is consistent with a legal and accounting professional bent. Figures 4 and 5 are concerned with activities and lead to questions about input and output, effectiveness and impact. These are consistent with an economist's, politician's or businessman's world view and perhaps reflect a greater concern with ends than means. Figure 2 reflects issues of interest to political scientists and Figure 3 would appeal to the student of administration.

C2. Values and Perspectives

Differences between the models not only reflect differences in professional perspectives but also the values that underlie evaluations. Most early work in program evaluation sought to be pragmatic and practical and above all objective. Values were not explicitly addressed, but assumed to be universally shared. The Treasury Board approach to evaluation is of this type. For example, the Treasury Board Principles (1981b) conspicuously avoids discussion of values, instead placing a great deal of emphasis on objectivity. Objectivity is difficult to achieve in evaluating government programs which impinge on so many philosophical and ethical controversies. Interest in the cost and use of resources, and the timely provision of services (efficiency), and in the intended and unintended impacts of programs (effectiveness), imply some assumptions about the responsibilities of the public service, its accountability and the nature of the "public interest". Making the values assumed in an evaluation explicit facilitates interpretation and application of the results by those who commissioned the work.

In approaches where values are made explicit they are used in selecting descriptive models, in selecting questions and in defining standards or criteria against which to compare the answers. There are some outstanding examples in the Canadian literature.

The Economic Council of Canada (1979) undertook a massive review of Canadian regulation under the Regulation Reference commissioned by the federal government. It set the stage by defining its own perspective. It espoused three "fundamental values" : individual freedom, economic efficiency, and equity, and it used four "value premises" in assessing regulatory processes : informed decision-making, accountability, procedural fairness and openness. Cairns (1980) and Economic Council of Canada (1981) discuss these values in relation to political philosophy and social and economic objectives, and make comparisons with the United States.

The Law Reform Commission (LRC) has also published a series of papers on independent regulatory agencies in Canada and its working paper of 1980 defines the values used as a basis for evaluation. They are : accountability; authoritativeness; comprehensibility; effectiveness, economy and efficiency; fairness; integrity; openness; and principled decision-making. Vandervort (1979) also discusses these in some detail in relation to LRC evaluation methods. Reschenthaler (1972) follows American practice in directing his attention to "the public interest" which he defines by means of a similar set of values to those of LRC. Posner (1981, 1977) discusses the origin of law, including regulation, and the relationship between its apparent economic purposes and social values and objectives. Both these references provide an interesting background to LRC values.

A third set of values clearly set out in the Canadian literature is much more specific and narrowly focussed. The Science Council of Canada (1982) is concerned with the settling of regulatory disputes. It states openness and objectivity as values, and relates these to methods of recruitment of regulatory board members and program staff, qualifications of regulators and the appropriate use of scientific expertise in the regulatory process.

As noted earlier, values are generally not made explicit in the Treasury Board approach to evaluation, although they are undoubtedly influential in the process and its results. Rutman (1980) and Rutman and de Jong (1976) provide information about what values actually are involved. They and Jordan and Sutherland (1979) believe that Treasury Board evaluation would be more effective if values were considered explicitly and the scope of potential evaluation issues consequently broadened. They believe that evaluation conducted from the operational management point-of-view (i.e. internally commissioned) takes program goals for granted and results in sequences of "small victories and economies", while the major evaluation issues of program effects and alternatives to the present program remain unexamined.

Borich and Jemelka (1982) and Zammuto (1982) review the part played by values in evaluation in great detail. They describe a variety of approaches to evaluation and evaluation methods that incorporate values more explicitly. They also describe methods of determining the unstated values underlying an evaluation and the values of program managers and other stakeholders in programs. Connor et al. (1984), Hoos (1983) and Poister (1978) also discuss the subject in some detail.

Values do not influence evaluation methods and results in isolation from other factors. In particular, values are closely connected with the prevailing political and fiscal climate at any given time and with the tenets of the particular political philosophy that happens to be in fashion or in power at that time. In Canada there is a tendency to ignore this connection, perhaps because of the considerable overlap in political philosophy of the two parties that have formed federal governments. Political attitudes have changed however, with a gradual increase in interest in evaluation of public programs as their effectiveness and costs have been openly questioned. This gradual change has manifested itself through a series of reform initiatives by government which are fully reviewed in Stanbury and Thompson (1982). They include investigations by the Economic Council of Canada and the Law Reform Commission, both mentioned above, the Institute for Research on Public Policy, the Lambert Commission, the

Peterson Committee and several parallel studies carried out for provincial governments. The most recent initiative (Nielsen, 1985) postdates Stanbury and Thompson's review. Doern (1982 and 1977a) and Schrecker (1984) provide some specific accounts of the political context of health, safety and environmental regulation in Canada.

In the United States' literature there are many references which discuss the influence of political philosophies, ethical values and their interrelationships on program evaluation. Weiss in a classical paper reprinted in Hyde and Shafritz (1979) demonstrates just how important the political context of evaluation is. Wildavsky, in the same volume, discusses how the degree of conviction with which political beliefs are held has changed in the last half century and how recent changes have influenced program evaluation. White (1981) perhaps approaches the subject most directly in analysing how values and political positions affected 12 regulatory decisions under the Carter Administration. Clark et al. (1980), Meyers (1977) and Wilson (1980) also address the subject. United States Executive Office of the President (1985) and the United States Presidential Task Force on Regulatory Relief (1983) offer evaluations based directly on political philosophy and its application as policy. The Nielsen (1985) task forces are the closest Canadian equivalent but their work is not publically available.

Understanding the political context of an evaluation, explicitly stating values that are premises on which evaluative assessments are based, and choosing one or more discipline perspectives are important because they help clarify the objectives of that evaluation. They are also important because they provide grounds for limiting the selection of what the Treasury Board calls "generic issues" and thereby narrowing the search for specific evaluation questions.

References Most Useful to AECB

The most complete account of values in evaluation, including its influence on methodology, is in Borich and Jemelka (1982). Zammuto (1982) is also an important reference. Stanbury and Thompson (1982) provide a good review of the political context of evaluation in Canada. Doern (1982) and Schrecker (1984) discuss the political background to regulation in a manner specific to AECB. For a more general treatment of the subject Weiss and Wildavsky's contibutions to Hyde and Shafritz (1979) are very informative. White (1981) provides illustrative American examples. The Economic Council of Canada (1979), the Law Reform Commission (1980), Reschenthaler (1972) and the Science Council of Canada (1982) provide the most explicit declarations of values in Canadian evaluations. Rutman (1980), Rutman and de Jong (1976) and Jordan and Sutherland (1979) discuss values in relation to the Treasury Board evaluation system.

C3. Identifying Generic Issues

C3.1 Generic Issues

Treasury Board refer to "generic" or "basic" evaluation issues when describing questions such as : "Are the activities and outputs of the regulatory program consistent with its mandate ?"; "What impacts and effects result from implementing the program ?"; and "What are the alternatives to the program ?" In the draft paper on regulatory programs, Treasury Board (1985) provides a list of 23 generic issues in three categories : rationale issues, impact issues and alternatives. The three questions quoted above exemplify the three categories.

Other Canadian references including well developed lists of generic issues are Brown-John (1976), Stanbury (1980, 1978), Stanbury and Thompson (1982), Economic Council of Canada (1979) and Schultz in Kernaghan (1983). Doern et al. (1975) provide a breakdown of issues by discipline orientation. More specific to independent regulatory agencies are the Law Reform Commission's series of publications including the working paper (1980) and Vandervoort (1979) in particular. Doern's (1976) paper in this series is specifically relevant to AECB.

Comparable American sources of generic issues, which also provide background discussion of their significance and appropriateness, are the report of the Ash Council (Ash, 1971) and a critique of its recommendations by Noll (1971). Ferguson (1981) also provides a good review at this level of detail. The United States Office of the Comptroller General (1981a and b) covers a very wide range of issues, including many related to nuclear energy, in its reviews of electric power regulation and of its effects on the industry. White (1981) discusses major regulatory issues that arose during the Carter administration. Clark et al. (1980) provides a detailed account of the issues raised by the advocates of less government intervention. These have also been raised in Canada, if in a more muted tone. The report of the Royal Commission on Australian Government Administration (Australia, 1976) addresses generic issues familiar to Canadians in a characteristically direct manner, Keeling (1972) and Jackson (1982) deal with similar issues in the United Kingdom, and U.K. Royal Commission on Environmental Pollution (1972) addresses generic issues in industrial pollution in estuaries.

Another source of generic issues that is of particular interest to AECB is the rather extensive literature on "The Nuclear Debate". This concerns itself mainly with nuclear proliferation, nuclear safeguards and health and environmental concerns, but many books also examine regulatory programs, with varying degrees of accuracy and detail. Some of the authors of these books, papers and commission reports are honest advocates of a particular point-of-view; others seek greater objectivity. Regardless of this, the references are important in identifying issues with high political profiles. Among the more objective are the following. In Canada the work of Doern (e.g. Doern and Morrison, 1980; Doern, 1982, 1977a, 1976) is prominent. Basuk and Nichols (1979) and the British Columbia (1980) and Ontario (1976) Royal Commissions on the Health and Safety of Mineworkers and the Ontario (1978) Royal Commission on Electric Power and Planning are also useful sources. Williams (1980) and the Royal Commission on Environmental Pollution (U.K., 1976) provide British based examples, and Aviel (1982), Eichholz (1976), Shrader-Frechette (1980) and Willrich and Lester (1977) American-based ones. Walker and Lonnroth (1983) discuss the political and strategic implications of nuclear proliferation. Issues of nuclear proliferation tend to be treated separately. Chayes and Lewis (1977), Krass et al. (1983) and Stockholm Peace Research Institute (1979) treat the subject comprehensively.

On occasion, issues of this type are discussed in publications by regulators. AECB is one of the leaders in this, as evidenced by Jennekens (1980), Pannell and Campbell (1980) and Domaratzki (1984). Some of the U.S. Nuclear Regulatory Commission Reports (1985, 1979, 1975) and the reports of the United States Inter Agency Review Group (1979) and the President's Commission on the Accident at Three Mile Island (1979a) also deal with such issues.

The references discussed in this section are useful sources of generic issues ; there are also some references, mainly textbooks or books of collected papers, that deal specifically with how to identify generic issues. These include Austin and Associates (1982), Freeman and Solomon (1981), (especially the contributions by Cronbach et al. and Wholey), Hatry et al. (1976), Kaufman and Thomas (1980) and Woods Gordon (1983).

References Most Useful to AECB

The Treasury Board (1985) draft paper on evaluation of regulatory programs is, by definition, of pivotal importance to AECB evaluation. Other important Canadian papers providing generic issues are Stanbury (1978), Economic Council of Canada (1979) and Law Reform Commission (1980). Doern (1976) deals specifically with AECB. Other papers that may be particularly useful are Australia (1976), United States Office of the Comptroller General (1981b) and Williams (1980).

C3.2 Use of Descriptive Models to Define Questions

Descriptive models are very useful to the designer of evaluations. Focussing on the linkages between the elements of a model facilitates the identification of issues. The more general the model the more general the issues. To obtain more specific questions it is necessary to break the model into components and reexamine the linkages at the next scale down in the hierarchy. This can be seen by comparing Figure 1 (page 194) with Figures 2 and 3 (pages 195 and 196). Linkages in the models present inputs to and outputs from each element, some of which may be in the form of constraints on, or facilitation of, the activity within the element. By considering this in detail, it is possible to identify the factors affecting the activity that are likely to be most influential. These will be the subject of key questions. Some of the linkages may have a more far reaching influence than others. By examining the complete set of detailed questions in the context of the entire model these linkages, and associated key questions, may be identified.

The Treasury Board (1985) draft report on evaluation of regulatory programs provides some very clear examples of the process described above using Treasury Board logic diagrams. I.D. Systems (1984) provides a very detailed account of this process for an actual program. Other examples listed in the bibliography are Canada Health and Welfare (1984), Smith (1982) and Connor et al. (1984). Rutman (1980) discusses the precise definition of evaluation questions under : "Enhancing Program Evaluability" - an apt heading.

Treasury Board logic diagrams are loosely based on systems models. Borich and Jemelka (1982) provide a comprehensive account of the use of systems models in evaluation and show how to construct detailed hierarchical models appropriate to both process- and impact-oriented approaches. They illustrate the examination of linkages, constraints, inputs and outputs to proceed from generic issues to specific key questions. Zammuto (1982) also examines current models but proposes an "evolutionary" model designed to accommodate changes in external factors and allow a program to be evaluated in the context of the many factors influencing its performance. ESSA (1982) provides a Canadian example of application of the systems approach to evaluation. It uses some of the accepted systems approaches to model development and issue identification, including "brainstorming" workshops involving program stakeholders. Because ESSA's evaluation is of a method of environmental impact assessment, it includes a good deal of regulatory content. LGL, ESL and ESSA (1984) is another example of the method applied to a Canadian environmental regulatory problem. Ikeda and Winterfeldt (1982) used systems models in analysing the development of standards against noise generated by high speed trains in Japan. Their paper provides another useful illustration of the method. Hoos (1983) again provides counterarguments to the use of the systems approach.

References Most Useful to AECB

In this section Treasury Board (1985), I.D. Systems (1984) and Borich and Jemelka (1982) are vital references. ESSA (1982) also has much to offer.

C4. More Specific Questions

This section covers references that are less general in scope than those in the previous section. We have divided them into two categories based on evaluation perspective, and a third technical category. The first category focusses on issues such as : "Is the regulation being administered in accord with ethical and legal principles ?"; and "Is the process efficient ?" The second is more concerned with effectiveness in achieving program objectives. The distinction between the first two categories is not absolute. For example, questions about program impacts obviously feed back to questions about whether alternatives to the program might be better. The technical category includes references where engineering and scientific matters are preeminent.

C4.1 Process-Oriented Approaches

C4.1.1 Entire Regulatory Programs

Process-oriented approaches tend to be preoccupied with how decisions are made and whether "due process" or other predetermined criteria are satisfied. They tend to be value based. There are many examples in the bibliography that review entire regulatory programs. Some of these have already been mentioned under "Identifying Generic Issues" above. Papers by the Law Reform Commission (1980) and Doern (1976) are among them. Other relevant examples in the LRC series are Lucas and Bell (1977) on the National Energy Board, Janisch *et al.* (1978) on the Canadian Transport Commission and Johnston (1980) on the Canadian Radio-Television and Telecommunications Commission. Leadbeater (1980) and Schrecker (1984) are also broad in scope. Other Canadian examples may be found in Gibson (1978) on regulation of a northern mining project, Gordon (1981, 1980) on agricultural land-use and regulation of noise, both in Alberta, the Royal Commission on the Ocean Ranger Marine Disaster (1984) on marine safety regulation, Pearse (1982) on fisheries regulation, Ontario (1983) on the regulation of the for-hire trucking industry, Ontario (1978) on the regulation of the electric power industry, Reschenthaler (1978) on economic regulatory agency programs in western Canada, Nix and Clayton (1980) on motor carrier regulation, Science Council of Canada (1982) on regulation of scientific activities and Scott and Neher (1981) on fisheries.

American examples are provided by Wilson (1980) and Welborn (1977) who deal with the major U.S. regulatory agencies, by the United States National Research Council (1977) on evaluation of decision-making in the Environmental Protection Agency, by Pois (1979) on the U.S. Comptroller General's Office, by Britain (1981) on the Experimental Technology Incentives Program, by the U.S. Comptroller General's Office (1981b) on the regulation of electric power, by the U.S. President's Commission on the Accident at Three Mile Island (1979a), and by Gorinson (1979) on the same subject. Fry and Morison (1982) is an Australian example on the regulation and management of waste from uranium mining and milling. Burn (1967) compares the U.S. and U.K. nuclear regulatory processes up to that time. Mazmanian and Sabatier (1981) includes many American examples, as does White (1981).

References Most Useful to AECB

The reports in the Law Reform Commission Series, including the working paper on independent regulatory agencies (1980), Doern (1976), Lucas and Bell (1977) and Leadbeater (1980) are the most useful Canadian papers. The United States National Research Council (1977) and the Three Mile Island reports (Gorinson, 1979; and U.S. President's Commission on the Accident at Three Mile Island, 1979a) are the most useful foreign sources. It is noted that AECB has published a report on the applicability of Three Mile Island findings to its regulatory program (Pannell and Campbell, 1980). Joyce (1981) is an AECB paper that examines the process of preparing regulatory documents in detail.

C4.1.2 Efficiency of the Regulatory Process

Many papers, especially those that are impact-oriented, tend to play down efficiency as a component of program evaluation. They suggest that efficiency measures are part of various kinds of audit function rather than evaluation. This argument is technically defensible, but irrelevant to the concerns of the practical manager. Auditing guides such as Flesher and Siewert (1982), Sayle (1981) and Thierauf (1980), and productivity texts such as Adam and Dogramaci (1981), are a source of questions about efficiency that are relevant to evaluation. Efficiency is a part of program evaluation because cost and use of resources are important factors in assessing whether a particular program or approach is the best way of achieving government objectives. Steiss (1982) provides a comprehensive reference that explains these relationships and Bardach and Kagan (1982) analyse the consequences of an inefficient process. Canada Office of the Auditor General (1978) reviews the application of audit methods to determine "value for money" and discusses the issues this involves.

Other useful sources of questions on efficiency of public programs are the Royal Commission on Australian Government Administration (Australia, 1976), Hartle (1978), Jordan and Sutherland (1979) and Maybee (1984) in Canada, and Jackson (1982) and Keeling (1972) in the United Kingdom. United

States General Accounting Office (1984) provides a very detailed and relevant example in its analysis of the effectiveness of the Federal Energy Regulatory Commission. United States Department of Energy (1982) offers a comprehensive analysis of its program under "sunset review" requirements. Denton (1977) deals with issues specific to the efficiency of the U.S. nuclear plant licensing process.

One subject of great sensitivity in the literature on program evaluation is any assessment of the role, influence or performance of individuals responsible for the management and operation of a program. Many books and papers discuss the resistance or outright opposition of program managers to evaluation, and attribute it to the fear of program cuts and threats of job security. Most offer advice to counter this resistance, usually based on the premise that program design, operation and output can be evaluated without any reference to the individual roles and performance. This is nonsense. A perfectly designed program will fail if implemented by incompetents and even the most capable managers may find it difficult to make a poorly designed program effective.

Fortunately there is a good deal of literature that addresses this issue directly, including Australia (1976) referred to above, Ash (1971) and Murphy 1981. Britain (1981) and Mazmanian and Nienaber (1979) discuss the resistance of bureaucracies to change. Jackson (1982) provides a thorough analysis of human behaviour in government organizations from an outside perspective, and Vickers (1980) discusses the problem from the viewpoint of a participant in program management. He deals in detail with conflicts between personal reputation and ambition on one hand and responsibility to an organization on the other. ESSA (1982) categorizes types of people found in program management and discusses their roles in regulatory processes. Hall (1980) discusses types of behaviour exhibited by management and staff in bureaucracies and how some of these can undermine program effectiveness. Colinvaux (1982) traces these behavioural patterns to their biological origins and discusses some of the consequences for public administration and for society in general. Leadbeater (1980), Palumbo and Nachmias (1983) and Doern et al. (1975) stress the influence of methods of selecting executive and management staff in regulatory agencies. Welborn (1977), Wilson (1980) and Hanser (1965) review the backgrounds of senior management in regulatory agencies and look for evidence of any relationship between this and program implementation.

Stewart and Garson (1983) approach the analysis of organizational effectiveness at three levels : those of the individual, the group and the entire organization. They then attempt an integration. Ontario (1982) gives guidelines for measuring organizational effectiveness by the "Managing by Results" method, a type of output-oriented approach. Price (1968) defines many properties of organizations that influence effectiveness. Zammuto (1982) and Van de Ven and Ferry (1980) also provide some interesting insights into how organizations function. Goldhaber (1979) and Lewis (1980) deal specifically with communications within organizations. These rather wide-ranging books on organizations offer a great deal to an evaluator defining questions about their efficiency and effectiveness.

References of Most Use to AECB

Selection of the most important references from the preceding section is difficult. Flesher and Siewert (1982) is a convenient and usable auditor's guide. Sayle (1981) deals specifically with audits in the nuclear industry and Denton (1977) deals with a nuclear licensing process. Australia (1976), U.S. General Accounting Office (1984) and U.S. Department of Energy (1982) offer comprehensive coverage of questions of efficiency. Jackson (1982), Hall (1980) and Colinvaux (1982) all offer insights on the importance of individuals and individual actions, while warning of the natural behaviour of people in large organizations and its possible consequences. Stewart and Garson (1983) is perhaps the most comprehensive reference on organizational analysis. Price (1968), Van de Ven and Ferry (1980) and Goldhaber (1979) are also good sources of evaluation questions on the performance of organizations.

C4.1.3 Political Process

Figure 2 (page 195) gives a general description of the parts of the regulatory process that are not normally conducted by an independent regulatory agency but by whoever directs it. This direction is normally, in some sense, political. It is here that decisions about alternative approaches to achieving regulatory goals must be made and where evaluation designed to deal with such issues should be commissioned. In a Canadian context, Dewees (1980) discusses alternative approaches from an economic perspective as do the Economic Council of Canada (1981). Courville (1980) reviews the ECC recommendations on regulatory reform. Hahn (1982), Posner (1977), Ferguson (1981) and Freeman et al. (1973) all deal with alternative approaches to health and environmental protection regulation, but are based on economic theory. Doern (1979) also reviews the subject and Trebilcock et al. (1982) address it directly as "choice of regulatory instrument".

Fowler (1982) discusses Australian examples and includes a treatment of state and federal government interactions that is very interesting to Canadians. American work on different approaches to environmental regulation in particular is extensive (Freeman et al., 1973; Hahn, 1982; Richardson, 1976). Organisation for Economic Cooperation and Development (1972) is an international reference on the same subject. Bardach and Kagan (1982) is a similar volume dealing with social regulation.

Other papers dealing with the political process of regulation are interested in the relationship between the public, Parliament, the Cabinet and the independent regulatory agencies. Schultz in Kernaghan (1982) deals with this broad topic. The Law Reform Commission, in its working paper (1980), and in many of the papers in its series on the subject, is very interested in these linkages. Doern (1976) deals with the entire process in relation to AECB; Slatter (1982) deals with the role of Parliament; and Vandervort (1979) and Schultz et al. (1980) deal with the role of Cabinet. Tupper and Doern (1981) examine the role of crown corporations in relation to the Canadian economic system, its regulation, and the state of competition therein. There are many papers dealing with relations between the various branches of government in the United States but their findings are not applicable to the Canadian situation because of constitutional differences.

Public participation in the regulatory process has become a very popular issue in the last 20 years and the trend shows few signs of abating. Perhaps the most comprehensive catalogue of public participation issues, and of methods of accomodating them by changes in regulatory processes, is provided by the United States Advisory Committee on Intergovernmental Relations (1980). Chubb (1983) also provides a detailed treatment of public participation in U.S. government decision-making and Ebbin and Kayser (1974) cover the same subject. The subject has also been a popular one in Canada. The Economic Council of Canada (1981), Englehart and Trebilcock (1981) and Fox (1979) all deal with the subject. Reschenthaler (1972) deals with it in relation to a particular interest group, the Consumers' Association of Canada, and Priest (1982) reviews the anticipated influence of freedom of information legislation on the regulatory process, and, in particular, on regulatory documents and submissions. Reports of Federal Environmental Assessment and Review Panels (e.g. FEARO, 1980; 1979) provide examples of one kind of public participation in action. Matthews (1976) reviews public participation in Australian government activities and Williams (1980) discusses the situation in the U.K. with particular reference to nuclear regulation. He is one of the few authors to question the desirability of greatly increased public participation and the quality of public interventions. By way of illustration, he demonstrates the irrationality of much of the public debate on nuclear issues.

References Most Useful to AECB

Of the papers dealing with the alternative methods of regulation Dewees (1980), Doern (1979) and Trebilcock et al. (1982) are the most useful Canadian examples. Hahn (1982) and Posner (1977) are also of interest. Vandervoort (1979), Law Reform Commission (1980) and Slatter (1982) are important in framing questions about the political process of regulation. The most valuable references on public participation are U.S. Advisory Committee on Intergovernmental Relations (1980), Fox (1979) and Reschenthaler (1972). Priest's (1982) paper on freedom of information is relevant and Williams (1980) discussion is useful.

C4.2 Impact-Oriented Approaches

C4.2.1 Entire Program

The Treasury Board Guide (1981a), Principles (1981b) and draft paper on the evaluation of regulatory programs (1985) provide examples of issue identification and question selection with an emphasis on program outputs and objectives. Hartle (1978) provides a discussion of the advantages of the approach and some of the difficulties; Jordan and Sutherland (1979) present counter arguments. I.D. Systems (1984), Smith (1982) and Canada Health and Welfare (1984) provide actual examples of evaluation assessment studies. Saskatchewan (1982) offers an issue list that is quite consistent with the Treasury Board approach.

More detailed discussions in a Canadian context are to be found in Stanbury (1980, 1978), in Economic Council of Canada (1981), and in the many case studies undertaken in the ECC Regulation Reference Series where emphasis is, naturally, economic. Stanbury's papers and Cairns (1980) review the subject of economic and social impacts, compare the Canadian and American situations and identify many evaluation questions. Doern (1979) discusses regulatory program impacts across Canada. Many of the ECC reports that review particular regulatory subjects offer useful models of question definition. For example, Felske and Associates (1981) deal with the non-ferrous metal industry, Gorecki (1981) deals with pharmaceuticals, Nemetz _et al._ (1981) and Rohlich and Howe (1981) with toxic materials and Scott and Neher (1981) with fisheries. Dale-Johnson (1981) is one of several papers dealing with land-use regulation. These publications consider the cost of compliance with regulatory requirements as well as the economic and, in some cases, (e.g. Globerman and Rothman, 1983) socio-economic impacts of regulation. SECOR (1980) has investigated the cost of compliance with AECB's regulations as well as investigating their economic impacts. Cook and Woods Gordon (1981) and Alberta (1985) deal specifically with the costs of compliance. Brantingham (1981) deals with the comparative cost and impact of modes of delivering legal aid. Schultz in Kernaghan (1983) reviews some of the issues raised by these authors and others, and the extent to which they can actually be resolved. Nielsen (1985) indicates that some of the issues analysed in this work have not escaped the attention of policy-makers at the political level, but it is too early to tell whether this will influence Treasury Board evaluation practice.

American literature on the effects and impacts of regulation, on the desirability of its effects, and on alternative ways of achieving effects that are desired is very extensive. This is attributable to the magnitude of effort devoted to evaluation in the United States and to the active public debate about the extent and nature of government intervention in private activities in that country.

Among general references on the subject Clark et al. (1980) and Ferguson (1981) include many useful papers on the measurement of program impacts and proposals for regulatory reform. Karam and Morgan (1976) also include useful papers on estimating program outputs, several of which deal with regulation in the nuclear industry. Richardson (1976) and Rossi et al. (1979) provide several illustrative examples of analysis of regulatory impacts, but Berry (1982) and Hoos (1983) find present approaches to such analyses inadequate. Clark et al. (1980) and Miller and Yandle (1979) review program impacts in the context of proposed regulatory reform.

There are a number of more specific evaluations, or sets of evaluations, that are particularly illustrative. United States Department of Energy's (1982) Sunset Review reports are perhaps closest to the Treasury Board and Nielsen (1985) approach. The United States Office of the Comptroller General deals with the effects of regulation on the electric power industry (1981b) and defines many important questions, especially in relation to cost-benefit analysis, in a 1984 publication. Fromm (1981) offers a microeconomic analysis of eight regulatory programs. Posner and Scott (1980) give a multidisciplinary analysis of the effects of Securities and Exchange Commission regulation that includes much information of more general application. Hatry et al. (1973) also offers some instructive examples, including an often quoted treatment of the effects of traffic laws in Connecticut.

Many evaluations, including most of those conducted under Treasury Board guidelines, suffer from being too restricted in scope. The problem is particularly severe when the analysis of alternatives to existing regulatory programs is required. Some authors have achieved useful results by looking for alternatives in a broader setting. The Institute for Energy Analysis (1979) looked at alternative scenarios in the event of a U.S. nuclear moratorium and compared economic, health and environmental costs estimated for each alternative. Environmental Resources Ltd. (1983) have reviewed the impact of future changes in coal industry technology and regulation in Europe, and Krutilla et al. (1978) have conducted a similar study in the U.S. All three studies raise issues of relevance to regulatory evaluations and refine them into more specific questions.

A related subject that has occasioned a regulatory initiative in Canada is socio-economic impact analysis. Socio-economic impact analyses of the effects of significant changes in regulation, or of the introduction of new regulation, are now required (McCabe, 1978). Finsterbusch (1980) and Colorado State University (1975) provide reviews of the subject.

References Most Useful to AECB

Reports that follow the Treasury Board approach (Treasury Board, 1985; I.D. Systems, 1984) or resemble it (U.S. Department of Energy, 1982; U.S. Office of the Comptroller General, 1981b) are very useful. Among specifically Canadian references Stanbury (1980, 1978), Cairns (1980), Felske and Associates (1981), Nemetz et al. (1981) and Rohlich and Howe (1981) are the most rewarding. Clark et al. (1980) and Karam and Morgan (1976) include many useful ideas. The Institute for Energy Analysis (1979) includes relevant and applicable considerations of nuclear alternatives. Any work by or for AECB should use the SECOR (1980) report commissioned by the Board as a starting point.

C4.2.2 Technical Issues

There are many reports that deal with issues that are essentially technical. In these cases the overall objective of the activities involved is understood and accepted, whether or not it is achieved, but there is uncertainty or debate about the effectiveness or suitability of the various technical methods and approaches available. These kinds of issues fall naturally into categories based on their technical fields.

C4.2.2.1 Health and Environment

Perhaps the best discussion of the relationship between technical or scientific issues and the regulatory process, at least in relation to nuclear energy, is in Doern (1978). The underlying regulatory issues in this paper are health and environmental impact; technical issues and their uncertainties are discussed in those contexts. Doern discusses the regulatory problems caused by the fact that many of the scientific issues have to be treated hypothetically because evidence of many possible impacts is lacking. Doern returns to these issues in Doern et al. (1982) and Doern (1982).

Health and environmental issues have been the subject of a number of commissions of inquiry. In Canada, the Ontario (1978, 1976) and British Columbia (1980) Royal Commissions and the Cluff Lake Inquiry (Bayda, 1978) are on nuclear issues. The recent Ontario (1985) commission on PCB's is also of interest. Ontario (1981) is a report by the Ontario Advisory Council on Occupational Health and Safety. The U.K. Royal Commission on Environmental Pollution (1976) also deals with radiation effects, and the 1972 Commission with industrial pollution effects on the environment. Jennekens (1980) discusses these issues on behalf of AECB. Other Canadian sources on this subject are Basuk and Nichols (1979) and Rohlich and Howe (1981). Foreign references include Eichholz (1976), Williams (1980), and more specific treatments of uranium milling by United States Nuclear Regulatory Commission (1979) and nuclear waste disposal by the United States Inter Agency Review Group (1979) and Willrich and Lester (1977). Fry and Morison (1982) is an Australian example dealing with public health and environmental protection in the management of waste from uranium mining and milling.

C4.2.2.2 Safety and Security

There are two kinds of issues that arise in the consideration of safety and security. One concerns the safe construction and operation of nuclear facilities and the other concerns physical security of facilities and control of classified information. With respect to safe design and operation, there are many technical references. Inquiries following accidents such as Gorinson (1979), the United States President's Commission on the Accident at Three Mile Island (1979a), Grange (1980) and the Royal Commission on the Ocean Ranger Marine Disaster (1984) are useful sources.

Asmis (1981), Pannell and Campbell (1980) and Domaratzki (1984) are AECB reports on the subject. Doern and Morrison (1980) includes a number of papers reviewing issues of nuclear safety in Canada. International agencies such as the International Atomic Energy Agency (1974) and national agencies such as the United States Nuclear Regulatory Commission (1975) publish many reports on safe designs and testing and inspection procedures.

Many references discuss safety issues in a more general context than that of the nuclear industry. For example, Calabresi (1970) reviews legal, economic and actuarial issues involved in accidents and accident prevention. Danceau, in Bardach and Kagan (1982), discusses the issues that arise in evaluating inspection and enforcement programs.

One responsibility of AECB that fits loosely into the category of safety and security is that for the review of applications for patents that cover items related to the nuclear industry. Sviridov (1981) and Marcy (1978) have edited symposia in which patent policy and practice throughout the world are discussed. These references will serve to identify evaluation issues and questions with respect to AECB's patent work.

Matters of physical security and information control receive less public attention, at least in formal publications. Australia (1979) provides a good review of the issues raised by threats to security offered by international terrorism and other illegal actions. These issues are also partially addressed in some of the publications on nuclear proliferation control mentioned in an earlier section of this review. Issues including the effectiveness of inspection, surveillance and deterrence are raised in many papers dealing with police activity, some of which are reviewed in section D of this review. Perhaps of most direct application are Harrald et al. (1979) on evaluation of marine pollution abatement and Blewett et al. (1985) on the enforcement of Canada's Fisheries Act. Ontario (1981) deals with the effectiveness of an Act covering occupational health and safety.

References Most Useful to AECB

In general coverage of matters of health and environment the Canadian examples are the most directly relevant to AECB. Doern (1978, 1982), Ontario (1978, 1976), British Columbia (1980) and Bayda (1978) are important sources. The reports by the U.S. Nuclear Regulatory Commission (1978) and the Inter Agency Review Group (1979) are also valuable. Sviridov (1981) and Marcy (1978) are the appropriate references for the review of patents. In matters of safety and security Gorinson (1979), Pannell and Campbell (1980), Domaratzki (1984), U.S. Nuclear Regulatory Commission (1975) and Australia (1979) are most useful. Blewett et al. (1985) is very useful to evaluators of surveillance and enforcement programs.

D : METHODS OF ANSWERING QUESTIONS

It is convenient to divide methods of answering questions into two groups : general methods of scholarly or scientific enquiry and methods specific to certain disciplines or to certain approaches to evaluation.

D1. General Methods of Scholarly Enquiry

Some practitioners of evaluation in the United States seek to place evaluation on a firm scientific foundation by using controlled experiments in which some individuals or groups are subjected to a program and others are not. Wortman (1983) reviews this approach. Brantingham (1981) is an example of the application of experimental evaluation methods in Canada. Obviously this approach cannot have a wide application as most government programs cannot be manipulated in this way. Most evaluators must therefore use traditional scholarly methods to investigate what exists and is beyond their control.

These traditional methods include document and literature review, interviews and the use of questionnaires, and the historical reconstruction of events or case studies. Comparison with other programs is also a method of general application, as is the use of peer or expert review and of conferences and workshops to provide an ideal or standard for comparison. Many papers, particular case studies or actual evaluations use several or all of these methods. Canada Health and Welfare (1984), Muller (1977) and Scarff (1983) are illustrative examples. The first two are among the few papers to include the use of expert opinion. Some authors rely solely on their own intellectual acuity, address themselves to principles, and avoid massive data gathering exercises (e.g. Ash, 1971; Law Reform Commission, 1975). In many cases authors do not describe these traditional methods, assuming that the reader will be familiar with them or will consult textbooks on social science research methods such as Grinnell (1982) and Poister (1978). There are a few exceptions. Those most relevant to AECB are Davis _et al._ (1981), Denton (1977), United States Department of Energy (1982), United States Comptroller General (1980) and Vandervort (1979). Flesher and Siewert's (1982) auditing guide is also useful in this respect.

Case studies are really essays in contemporary history and most people are familiar with the historian's approach. In fact, many historical works evaluate past programs and offer valuable insights to today's managers. One of the most instructive examples for senior managers is Von der Porten's (1969) analysis of the German Navy in World War II. Sims (1980) has written a history of the AECB. Case studies that illustrate a broad range of traditional methods are plentiful in the literature. Often more can be learned from cases where something went wrong than from mundane examples. Hall (1980), for example, describes a number of failures in programs that had large financial consequences. Reports of

Commissions of Inquiry such as the Royal Commission on the Ocean Ranger Marine Disaster (1984) and the American studies of the Three Mile Island Accident (Gorinson, 1979, U.S. President's Commission, 1979a) fall into this category.

There are reports that deal with specific regulatory cases as opposed to regulatory programs. Gibson (1978) and Doern (1978) are Canadian examples. White (1981) offers a number of American examples. Many evaluation reports include case studies. Doern (1976), dealing with AECB, and Lucas and Bell (1977), dealing with NEB, are important examples. Rees (1980) is a case study of a decision allowing dredging in McKinley Bay. Some of the Economic Council of Canada Regulation Reference publications also include case studies. Felske and Associates (1981) and some of the reports on fisheries summarized in Scott and Neher (1981) are perhaps the most useful. Many American references include case studies as examples. Hatry et al. (1973), Hyde and Shafritz (1979), Kelman (1981) and the appendices to United States National Research Council (1977) are examples of which the latter is the most detailed. Ikeda and Winterfeldt (1982) is a Japanese example.

Some papers offer illustrative examples of certain aspects of the general scholarly method. For example, Wilson (1980), Basuk and Nichols (1979) and Noll (1971) depend heavily on document review and literature searches. Many studies rely on interviews and opinion sampling by questionnaires. Alberta (1985), Anderson (1981), Aviel (1982), Blewett et al. (1985), Chubb (1983), I.D. Systems (1984), Slatter (1982) and U.S. Advisory Committee on Intergovernmental Relations (1980) are examples of this kind. Thierauf (1980) offers details of interview and questionnaire methods for audits. Most of the Law Reform Commission reports dealing with independent regulatory agencies (e.g. Doern, 1976; Lucas and Bell, 1977; Johnston, 1980; and Janisch et al., 1978) and many other studies exemplified by Welborn (1977) combine interviews and document review. Some authors are critical of the use of qualitative data from interviews but these criticisms are rebutted by Patton (1980). Non-parametric methods of analysis of qualitative data are now quite well developed. Jackson (1982) offers useful advice on the conduct of interviews and the analysis of interview data. Treasury Board (1984) offers some officially approved methods.

The use of conferences, workshops or panels of experts to define precise questions (hypotheses) and to develop methods of answering (testing) them is a hallmark of systems analysis. This group of methods is described in Borich and Jemelka (1982). A large number of examples are reviewed in ESSA (1982) where the use of the methods in Canadian environmental regulation is advocated. LGL, ESL and ESSA (1984) provide an example of precise hypothesis selection by this method. Woods Gordon (1983) describes assisting the Ontario Public Commercial Review Committee in its decision-making process. Other examples of the use of workshops are the Royal Commission on the Ocean Ranger Marine Disaster (1984), the U.S. President's Commission on Law Enforcement and the Administration of Justice (1967), and on standard-setting, Beeghly et al. (1968) .

Another rather general method that has been used in a variety of evaluations of different kinds is the comparison of one program with others, or occasionally with a predefined ideal. Franson et al. (1982) provides the most formal example of comparing regulatory performance with ideal standards. Examples of comparative analysis of regulatory programs in the nuclear energy field are Davis et al. (1981), Mills (1978) and Stevenson and Thomas (1983). Fox (1979) compares public participation in AECB's regulatory program with that of CRTC. Gordon (1980) compares noise regulation in Alberta with that in other jurisdictions and the Royal Commission on the Ocean Ranger Marine Disaster (1984) compares the marine safety regulation programs of several countries. Kelman (1981) compares regulation in general in Sweden with that in the United States. Reschenthaler (1972) compares independent economic regulatory agencies in western Canada and Waverman (1982) compares Canadian telecommunications regulatory programs. Wilson et al. (1975) compares execution of the Auditor-General function in different countries.

A somewhat analagous comparative method is to compare a number of evaluations of the same program or a number of studies of the same case or cases. Wortman (1983) discusses this in some detail and calls it "Meta-Analysis". Wortman's methods are elaborate, quantitative and can rarely be applied. However, the approach can be used at a simpler qualitative level. The U.S. Comptroller General's Office (1980) evaluated the several inquiries into Three Mile Island, offering useful methodological comment. Pannell and Campbell (1980) distill what is useful for AECB from the various reports on the incident in what is essentially a similar approach.

References Most Useful to AECB

The Treasury Board (1985) draft report on the evaluation of regulatory programs lists some of the methods mentioned above and briefly describes their applicability, but provides little information on their use. Davis et al. (1981) offers perhaps the most complete coverage, by example, of these methods. Jackson (1982) and Welborn (1977) are also useful in this respect. Vandervort (1979) offers a detailed description of most of these general methods as practiced by LRC authors. Among historical and case studies, Hall (1980) and Van der Porten (1969) are worth reading : Doern (1978, 1976) and Lucas and Bell (1977) are more specifically relevant to AECB. Borich and Jemelka (1982) and ESSA (1982) cover systems analysis methods. Davis et al. (1981), Fox (1979) and Mills (1978) are examples of comparative analysis applied to nuclear regulation.

D2. Methods Specific to Discipline or Approaches

Classifying the more specific methodologies for the purposes of this review was difficult. Although papers tend to be grouped by common approach, they also tend to segregate by focus of interest and there is interaction between these two characteristics. The breakdown that follows is therefore more a matter of convenience than of underlying logic.

D2.1 Political and Social Sciences

There is a vast body of American literature on the evaluation of social welfare and educational programs that is preoccupied with social and socio-economic as opposed to economic or health, safety and environmental concerns. Although, as seen earlier, these concerns may have some application to regulatory programs, the specific methods of measuring impacts of social programs do not (e.g. Wortman, 1983). Such methods are discussed in a number of textbooks and reports including Rossi *et al.* (1979), Abert (1979), Grinnell (1982), Kaufman and Thomas (1980), Patton (1980), Poister (1978), Rutman (1980), Weiss (1972) and Wholey (1978).

This is not to say that analysis of socio-economic impacts of regulatory programs, as opposed to educational and social welfare programs, is irrelevant. The Canadian Government has recently introduced a requirement for socio-economic impact assessments of significant new regulation and major changes in regulation (Doern, 1979). Globerman and Rothman (1983) comes close to meeting this federal government requirement with respect to the Trademarks Act. Beesley *et al.* (1983) offers a social cost-benefit analysis of London Transport policies. While this may seem far removed from regulatory programs, in fact the methods of assessing social effects and costs are quite instructive. Colorado State University (1975) articulates the conceptual and practical difficulties of socio-economic impact assessment and provides an excellent detailed analysis of available methods and methodological problems. Finsterbusch (1980) is a database style manual of socio-economic impact analysis replete with actual examples.

The major interest of political scientists in regulation is whether and how the electorate achieves its objectives through the process set out in Figure 2 (page 195). Doern's (1982, 1977a, 1976) work on the political economy of regulation in Canada and in particular on AECB and nuclear hazards (Doern and Morrison, 1980; Doern *et al.*, 1982) is both comprehensive and representative. Vandervort (1979), Slatter (1982) and Law Reform Commission (1980) analyse methods of political control of regulatory agencies and their effectiveness. Dewees (1980) considers political philosophy and its influence on regulation and political decisions about regulation. There is a great deal of analysis of this kind in the American literature, but it is not readily applicable to the Canadian scene because of differences prevalent in political attitudes and in political systems. The interplay between the branches of government in the United States has no equivalent counterpart in Canada. Some U.S. papers use methods that may be applied to Canadian cases. These are Chubb (1983), Pois (1979) and Welborn (1977). Zammuto (1982) describes methods of analysing public demand and the extent to which it is satisfied.

Literature of this type merges into that dealing with the art of political polling which attempts to determine what the electorate wants and what its priorities are. Polling is normally undertaken by political parties or by corporations conducting market analyses. There are exceptions; for example the study of environmental attitudes for the Environmental Council of Alberta by Kelly (1982). Polling is not covered in this review because it is not likely to be considered an AECB responsibility. However, the question of introducing public concerns and allowing actual public participation in the regulatory process has been a major political issue for the last 15 years. Evaluating options with respect to this issue is an appropriate concern for a regulatory agency. It is covered by an extensive literature.

Perhaps the most comprehensive treatment is in the United States Advisory Committee on Intergovernmental Relations (1980) report on citizen participation in the U.S. federal system. Other American references are United States Inter Agency Review Group on Nuclear Waste (1979), U.S. President's Commission on the Accident at Three Mile Island (1979b), Chubb (1983) on relations between interest groups and the Energy bureaucracy, and Ebbin and Kayser (1974) and Meyers (1977) on citizen groups, nuclear issues and nuclear regulation. Matthews (1976) describes the role of interest groups in Australian government activities. There are also many Canadian references on public participation in government. Fox (1979) analyses the subject for LRC and compares AECB and CRTC processes for public involvement. Doern (1976) also deals with AECB in this context as does SECOR (1984). Englehart and Trebilcock (1981) are largely preoccupied with ways of providing financial support for public intervention in regulatory processes. Canada's Federal Environmental Assessment and Review Office (1980, 1979) and Bayda (1978) provide actual examples of formal public hearings on matters relating to nuclear regulation.

References Most Useful to AECB

Colorado State University (1975) and Finsterbusch (1980) are useful guides to socio-economic impact analysis. Doern's work (1982, 1976, Doern et al. 1982), Vandervort (1979) and Slatter (1982) are particularly relevant to the political process of regulation at AECB. SECOR (1984) is obviously the starting point for AECB work on public information. U.S. Advisory Committee on Intergovernmental Relations (1980) is the most comprehensive reference in this field and Fox (1979) the most specifically relevant.

D2.2 Law and Public Administration

There are three broad topics that comprise this section of the review : examinations of legislation and rule-making; evaluations of the administrative process of regulation; and the use of boards, commissions or committees of inquiry.

The International Nuclear Energy Agency (1983) has published a complete analytical study of nuclear legislation in OECD member countries. Other papers specifically evaluating legislation in Canada are : Saskatchewan (1982) which reviews provincial legislation for effectiveness, redundancy and obsolescence; Gordon (1981) on agricultural land-use and land-use planning legislation and (1980) on noise regulation; Gorecki (1981) on amendments to the Patent Act with respect to drugs; Gummer (1982) on legislation for which AECB has administrative responsibility; and Law Reform Commission (1977) on the Inquiries Act. Waverman (1982) reports on a comparative evaluation of different legislative provisions intended to regulate telecommunications in several provinces. Doern (1979) and Anderson in Stanbury (1980) review the process of drafting of Canadian legislation. Kelman (1981) compares legislation and regulatory rule-making in Sweden and the United States and Rohlich and Howe (1981) discuss the drafting and explore the strengths and weaknesses of the United States Toxic Substances Control Act.

The Law Reform Commission's series of reports on the independent regulatory agencies in Canada are very detailed evaluations of administrative procedures from the point-of-view of administrative law. Vandervort (1979) discusses methodology most explicitly, but most of the papers are of interest to AECB. Law Reform Commission (1980), Leadbeater (1980), Doern (1976) and Lucas and Bell (1977) are particularly important. Other papers by Doern (1978, 1977a and b, Doern *et al.* 1975) should also be consulted. Reschenthaler, in Stanbury (1978), illustrates the comparative analysis of Canadian and American regulation and identifies the weaknesses of each. Murphy (1981) provides a public administration context for evaluation of regulatory processes and describes many useful methods. Posner (1981, 1977) provides a philosophical base that should be kept in mind during this kind of evaluation because it encourages concentration on the real objectives of regulation. Several reports of Commissions of Inquiry include evaluations of the administration of regulatory processes. They include Gorinson (1979), Ontario (1978) and the Royal Commission on the Ocean Ranger Marine Disaster (1984).

The establishment of boards, commissions or committees of inquiry normally requires political initiative. Sometimes control or even execution of inquiries or evaluation is retained by politicians or legislatures. Alberta (1985), Nielsen (1985) and United States Executive Office of the President (1985) are examples. More frequently an independent entity is established and charged with the responsibility for investigating an event (usually an accident), a problem or a program. There are a number of books which describe the methods of establishment and procedure of such inquiries and which are illustrated by many examples. Bulmer (1980), Hanser (1965), Rhodes (1975) and Wraith and Lamb (1971) all deal with British experience. Wolanin (1975) deals with United States Presidential Commissions. Law Reform Commission (1977) evaluates Canada's Inquiries Act.

The bibliography in this report includes many publications by Commissions of Inquiry that exemplify the methods discussed above. Few of these discuss their own methods, although Australia (1979 and 1976), the Royal Commission on the Ocean Ranger Marine Disaster (1984), the United States President's Commission on Law Enforcement and the Administration of Justice (1967) and the United States President's Commission on the Accident at Three Mile Island (1979a and b, and Gorinson, 1979) do so to varying degrees. Reports on what are mainly environmental hearings include Bayda (1978), FEARO (1980, 1979), Ontario (1985) and the U.K. Royal Commission on Environmental Pollution (1976, 1972). Ontario (1976) and British Columbia (1980) deal with health and safety in mines, Grange (1980) deals with an accident and toxic pollution incident at Mississauga, and Pearse (1982) uses the inquiry technique to evaluate the regulation of Canadian Pacific fisheries.

References Most Useful to AECB

Doern (1979), Gummer (1982) and Anderson in Stanbury (1980) are useful in reviewing Canadian regulation-making. International Nuclear Energy Agency (1983) and Kelman (1981) provide international comparisons. Almost all of the papers in the Law Reform Commission series on independent regulatory agencies are useful to AECB. The working paper of 1980 is a good starting point. Murphy (1981) is useful as a background to administrative studies. Bulmer (1980) and Wraith and Lamb (1971) appear to be the most useful of the references on the conduct of public inquiries. Of the actual Inquiry reports, the Canadian examples are naturally the most relevant.

D2.3 Management and Business Methods

Over the last 30 years there has been a surge of activity in attempting to apply analytical methods to business and management. The resulting volume of literature is immense. Much of it is applicable to corporations because it is closely tied to corporate goals. Some of it deals with government or is broad enough in application to include public programs. It was necessary to be restrained in selecting references for inclusion in this review so that only a few representative or particularly relevant ones are included.

One relatively new analytical approach is the analysis of decisions and decision-making. Information Spectrum (1983) is a good example of the decision analysis approach in which the risks considered are mainly financial. United States Nuclear Regulatory Commission (1975) is a study of reactor safety regulation in which the risks involved are of plant safety. U.S. Nuclear Regulatory Commission (1979) uses a descriptive model to simulate the performance of the agency under crisis conditions, another form of application of decision analysis. Some of the methods used in these studies, for example the use of decision trees to assess the importance of individual decisions, are potentially valuable to AECB and its evaluators. United States National Research Council (1977) also takes a general decision analysis approach to evaluating the U.S. Environmental Protection Agency.

Another subdisciplinary approach that is of possible use to administrative organizations is the analysis of communications within them. Goldhaber (1979) and Lewis (1980) are comprehensive standard textbooks on the subject. The only application of the approach to Canadian government programs that we could find is an unpublished analysis of the Northern Pipeline Agency (Dixson, 1984).

Perhaps the largest body of literature in management sciences, other than in financial management, is in the analysis of organizational behaviour, effectiveness and productivity. There are a number of texts which cover the entire field of which Hall (1982), Stewart and Garson (1983) and Van de Ven and Ferry (1980) are very useful. Price (1968) defines a variety of parameters of organizational behaviour that provide a rational basis for assessing performance and effectiveness. Colinvaux (1982) offers a novel and penetrating method of analysing human behaviour in organizations. Ghorpade (1971) and Zammuto (1982) also deal with effectiveness in a general context. Thierauf (1980) provides an audit approach to analysing the efficiency of an organization. Ontario (1982) outlines the "Management by Results" concept, an output-oriented approach to measuring performance within organizations that has no set procedures but is more an attitude integrated into the management cycle. Doern and Maslove (1979), Keeling (1972), Mazmanian and Sabatier (1981), Murphy (1981), Steiss (1982), Stewart and Garson (1983) and Welborn (1977) deal specifically with public service organizations. Jackson (1982) is particularly interesting in attempting to define achievable limits of performance and effectiveness in such organizations. The United States General Accounting Office (1984) and Mazmanian and Nienaber (1979) provide detailed examples of the application of this approach to evaluation of the U.S. Federal Energy Regulatory Commission and the U.S. Army Corps of Engineers, respectively. Engstad and Lioy (1980) includes many methods of analysis of the productivity of police.

Adam and Dogramaci (1981) is a textbook of productivity analysis that includes case studies and Cowing and Stevenson (1981) is a similar treatment that concentrates on regulated industries. Brown (1971), Mazmanian and Sabatier (1981), Murphy (1981) and Steiss (1982) attempt to deal with public service productivity. An interesting example of the application of one method within the range covered by this subdiscipline is the analysis of the tasks, skills and experience of staff of regulatory agencies by the Royal Commission on the Ocean Ranger Marine Disaster (1984).

References Most Useful to AECB

United States Nuclear Regulatory Commission (1979, 1975) are particularly relevant examples of decision analyses. U.S. National Research Council (1977) is useful as a much broader application. Goldhaber (1979) provides a thorough coverage of communications analysis and Hall (1982) and Van de Ven and Ferry (1980) good general treatments of organizational behaviour and effectiveness. Stewart and Garson (1983) is useful because it includes many examples drawn from the nuclear industry and because of its comprehensive treatment of the analysis of organizational behaviour. Among the more specific references, Zammuto (1982) and Price (1968) provide many useful insights on effectiveness. Jackson (1982), Mazmanian and Sabatier (1981) and U.S. General Accounting Office (1984) are particularly useful in their applicability to government programs.

D2.4 Economics and Accounting

This is another field in which there is a vast body of literature from which it is difficult to select a representative fraction. Papers often include analysis in more than one of the categories used to classify them here. There are various emphases in this kind of work, the largest distinction being between measurements of actual costs and the assessment of economic impacts, but these methods usually appear in the same papers. In this section we have made subdivisions as follows : cost of programs, efficiency, cost-effectiveness and audits, cost-benefit analysis and examination of program alternatives, and zero-based budgeting and sunset review. We have placed economic impact analysis in a separate section because it forms a part of many other methods.

Most published studies of the direct costs of regulation deal with the costs of compliance by regulated industries. The broadness of definition of these costs and their distinction from economic impacts varies with the study. Cook and Woods Gordon (1981) deals with the cost of compliance with Canadian regulation in detail. Other Canadian sources are SECOR (1980) which deals with AECB, and reports in the Economic Council of Canada Regulation Reference series : Proudfoot (1980), Nemetz et al. (1981), Dale-Johnson (1981) and Felske and Associates (1981) are among the most useful of these. Among American examples, Breyer and MacAvoy (1974) on the Federal Power Commission, and U.S. Office of the Comptroller General (1981b) on regulation of the electric power industry are relevant. United States Office of Science and Technology (1972) deals with environmental and safety regulation in automotive transportation, and provides much useful methodological information.

Internal costs, i.e. costs to government, are usually well documented through the normal budgetary process. Hartle (1978) provides a description of the Canadian system as do Lyden and Miller (1978) for the United States. Brown (1971), Hatry et al. (1976, 1973) and Jackson (1982) describe methods of assessing program costs as do the papers on audit methods referred to below.

Efficiency and cost-effectiveness are major concerns of auditors, especially with the move towards comprehensive and "value-for-money" auditing (Canada Office of the Auditor General, 1978). Pois (1979) reviews such methods in the United States General Accounting Office and gives illustrative examples. Flesher and Siewert (1982), Sayle (1981) and Thierauf (1980) describe audit methods. Cost-effectiveness studies are often linked with studies of administrative effectiveness, e.g. Steiss (1982) and Poister (1978), or efficiency of regulatory processes e.g. Brantingham (1981). Again some of the Economic Council of Canada Regulation Reference series of reports are relevant. These include Dale-Johnson (1981) and Gorecki (1981). Harrald et al. (1979), United States National Research Council (1977) and United States Office of the Comptroller General (1981a) provide instructive American examples. Hahn (1982) offers a theoretical approach to comparing the cost-effectiveness of different types of pollution control regulation, and United States Office of Science and Technology (1972) attempts a practical application. Wortman (1983) reviews cost-effectiveness from the perspective of a professional evaluator.

Cost-benefit analysis has often been held out as the logical solution to an evaluator's problems, (e.g. Economic Council of Canada, 1979). It has proved disappointing in practice, however, because of severe methodological problems, where it is difficult to assign financial values to program outputs or because it does not address the real objectives of regulation (Courville, 1980). These obstacles occur in many regulatory programs. The United States Office of the Comptroller General (1984), Schultz in Kernaghan (1983) and Peters (1973) review methods of cost-benefit analysis for government programs, including those of regulatory agencies, and Ray (1984) provides a recent general text. Rossi et al. (1979) cover both cost-benefit analysis and cost-effectiveness analysis. Ferguson (1981) discusses new areas of research into the estimation of the benefits and costs of regulation.

Swartzman et al. (1982) deals specifically with environmental regulation. Literature on cost-benefit methods for environmental, natural resource and health protection programs is extensive. Fisher (1981), Krutilla and Fisher (1975), Mills (1978), Peters (1982), OECD (1972) and the U.S. National Pollution Council (1971) provide methodological texts or papers. Dohan (1977) writes on the same subject and Clark et al. (1980) and Karam and Morgan (1976) each include several papers on the subject. Calabresi (1970) reviews methods of determining the costs of accidents which is a central problem in cost-benefit analysis of safety regulation. This subject is also dealt with by the U.S. Office of Science and Technology (1972).

Stanbury (1980, 1978) includes, in both volumes, papers dealing with the use of cost-benefit analyses in the evaluation of regulation in Canada and the United States. There is room to quote only a few actual examples in this review. Felske and Associates (1981) is one of the most informative Canadian examples. Beesley et al. (1983) on London Transport policies and United States National Research Council (1977) on the Environmental Protection Agency are also useful. Abert (1979) is interesting, but deals with social and educational programs. McCabe (1978) presents an assessment of the applicability of cost-benefit analysis to Canadian expenditure program evaluation based on a case study of U.S. experience with regulatory reform. Eichholz (1976) reviews costs, benefits and risks associated with the nuclear industry.

Zero-based budgeting and sunset review are measures that have recently come into prominence in public debate as methods of limiting or reducing government spending. Both involve complete review and justification of program funding on a periodic basis as opposed to the practice of more-or-less automatically continuing the "A" base budget. Various evaluation methods, including cost-effectiveness and cost-benefit analysis are usually recommended as part of the evaluation required. Knight (1979) and Thompson in Stanbury (1980) are Canadian references on the subject. Wholey (1978) and Sarant (1978) provide comprehensive treatments, the latter specifically for government programs. Clark et al. (1980) includes papers on the subject. United States Department of Energy (1982) provides an extremely detailed example of an actual sunset review.

References Most Useful to AECB

SECOR (1980) analyses the cost of AECB regulation. Cook and Woods Gordon (1981) is a useful methodological reference. United States Office of the Comptroller General (1981a and b) are very detailed American examples of cost and cost-effectiveness analysis. Dale-Johnson (1981) and Hahn (1982) are also worthy of mention on this subject. The literature on cost-benefit analysis is so profuse that it is difficult to select only a few references. United States Office of the Comptroller General (1984), U.S. National Research Council (1977) and Swartzman et al. (1982) are good places to start. Clark et al. (1980) includes several critical reviews of the usefulness of cost-benefit analysis. Felske and Associates (1981) is a good Canadian example of its use and Eichholz (1976) deals with the nuclear industry. Knight (1979) and Sarant (1978) introduce zero-based budgeting and United States Department of Energy (1982) is a model for sunset reviews.

D2.5 Economic Impact Analysis

Methods of assessing the economic impacts of regulation are mentioned in several program evaluation texts; Rossi et al. (1979), for example, devote a section of their book to the subject. There are, however, texts that deal only with this topic, such as Pleeter (1980). Fisher (1981), Mills (1978) and Freeman et al. (1973) also treat the subject in detail. Emmett's (1975) paper for Environment Canada deals with a particular methodological problem in measuring economic effects. Clark et al. (1980), Dewees (1980), Doern (1979), Economic Council of Canada (1979), Hoos (1983), Karam and Morgan (1976) and Thompson in Stanbury (1980) are all papers, or collections of papers, that review methods of determining economic impact. Ferguson (1981) examines several areas of economic impact, including cumulative effects and transition costs related to changing regulations. Cowing and Stevenson (1981) and Fromm (1981) deal with microeconomic analysis and present case studies or examples from nuclear regulation and independent regulatory agencies, respectively. U.S. Council on Environmental Quality (1972) analyses the economic impact of pollution abatement on 11 industries and the economy in general.

Canadian examples of actual assessments include Alberta (1979) which includes an estimate of the economic impact of what the authors consider to be inadequate regulation of oil and gas exploration in forestry, and many papers in the Economic Council of Canada "Regulation Reference" series, which are summarized in ECC (1981). Of the latter, Dale-Johnson (1981), Felske and Associates (1981), Gorecki (1981) and Scott and Neher (1981) may be the most useful. Richardson (1976) is a U.S. example similar to Dale-Johnson (1981). Brantingham (1981) examines the economic impact of Canadian judicare. McCabe (1978) examines the use of the economic impact statement as an evaluation tool and its potential for use in Canada. American examples include Breyer and MacAvoy's (1979) review of the Federal Power Commission and Krutilla and Fisher's (1975) five case studies of environmental regulation. Britain (1981) examines the impact of bureaucracy on innovation in regulated industries.

Papers by Krutilla et al. (1978), in the U.S., and Environmental Resources Ltd. (1983), in Europe, simulating alternative approaches to coal development are also instructive in terms of economic impact analysis, as is Institute for Energy Analysis (1979) on the impacts of a possible nuclear moratorium in the United States.

References Most Useful to AECB

Once again it is difficult to single out references that are most useful to AECB. Of the texts and reviews in the first paragraph above, Fisher (1981), Pleeter (1980) and Freeman *et al.* (1973) may be the most useful; and Cowing and Stevenson (1981) the most specific to the nuclear industry and its regulation. All the more specific studies mentioned in the second paragraph are of interest. They should be selected to match the needs of individual evaluators or evaluations.

D2.6 Science and Engineering

References under this heading fall into four categories : standard-setting; modelling, simulation and risk analysis in relation to nuclear regulation; technical aspects of effectiveness of health and safety regulation; and technology evaluation.

D2.6.1 Standard-Setting

Leggat (1971) is the standard reference on standard-setting in Canada. Basuk and Nichols (1979) and Lecraw (1981) are more recent references, and the latter includes eight case studies. Doern (1978) discusses the difficulties of setting nuclear standards in Canada and Doern *et al.* (1982) analyses standard-setting for health and safety regulation with particular reference to Ontario. Franson *et al.* (1982) compares standard-setting for certain toxic pollutants in several Canadian jurisdictions, and Gordon (1980) deals with noise standards in Canada.

There is an extensive worldwide literature on the subject of standards. Hart (1982) is perhaps the most complete example of setting technical standards, in this case water quality standards. Ikeda and Winterfeldt (1982) gives a thorough analysis of standard-setting practices and examines the example of noise pollution by high speed trains in Japan. United States National Research Council (1977) also has much to offer on the subject. Organisation for Economic Cooperation and Development (1972) deals with standards as an economic tool. Beeghly *et al.* (1968) includes 30 papers on nuclear standards.

References Most Useful to AECB

Hart (1982) is a model of standard-setting. Doern (1978), United States National Research Council (1977) and Franson *et al.* (1982) are useful in providing contextual detail relevant to AECB.

D2.6.2 Simulation Modelling and Technical Risk Analysis

There are two kinds of simulation modelling that are relevant to the evaluation of nuclear regulatory programs. One is the simulation of regulated industrial operations and the other is the simulation of entire regulatory processes, including technical components, which is used to specify risks associated with regulatory decisions. In the first category, the United States Nuclear Regulatory Commission (1979, 1975) and Limaye (1973) use simulation to elucidate risks associated with uranium milling and nuclear plant accidents, respectively. Another useful American example is United States National Industrial Pollution Control Council (1971) which models gaseous emissions for use as a tool for regulatory decision-making. Environmental Resources Ltd. (1983) uses simulation to assess health and safety risks of future coal development.

The Science Council of Canada (1977) reviews methods of risk analysis. Jennekens (1980) explains the AECB approach to the subject, which is exemplified in Domaratzki's (1984) paper on the CANDU reactor. Analysis of the risks associated with the nuclear power industry is described by Eichholz (1976), Hoos (1983) and Spangler in Karam and Morgan (1976). Nemetz et al. (1981) and Rohlich and Howe (1981) analyse toxic chemical risks in their paper in the Economic Council of Canada series. Reid Crowther and Partners (1980) present a preliminary risk analysis of transportation of hazardous waste, and Ontario (1981) looks at occupational health and safety risks. Kraft (1982) reviews attitudes towards the use of risk analysis in U.S. regulatory agencies. Doern (1982) and Brown (1980) discuss risks in the context of what is politically acceptable, both in terms of public attitudes and cost.

References Most Useful to AECB

In addition to AECB's own publications, U.S. Nuclear Regulatory Commission (1979 and 1975) are extremely useful. Among Canadian references, Science Council of Canada (1977), Nemetz et al. (1981) and Doern (1982) are relevant.

D2.6.3 Effectiveness of Health, Safety and Environmental Regulation of the Nuclear Industry

Many authors discuss nuclear health, safety and environmental issues without providing quantitative assessments of the adequacy of existing regulation. Brown (1980), Doern (1978), Eichholz (1976), and Williams (1980) cover nuclear issues in general, and Gilmore (1977) and Willrich and Lester (1977) deal with disposal of nuclear wastes. These authors provide more coherent accounts than most, and go further towards quantification and objectivity in their assessments. A number of reports of commissions of inquiry deal with the same subject. They include Ontario

(1976), British Columbia (1980) and the U.K. Royal Commission on Environmental Pollution (1976), as well as the U.S. President's Commission on the Accident at Three Mile Island (1979a and b and Gorinson, 1979). Bayda (1978) and FEARO (1980, 1979) report on environmental hearings that address these issues.

Canada Health and Welfare (1984) identifies health and safety risks and evaluates the effectiveness of regulations to protect against them and Ontario (1981) deals with occupational health and safety. Knight (1976) describes regulatory issues arising from the discovery of radioactive contamination at Port Hope, Ontario. The U.S. Inter Agency Review Group (1979) evaluates methods of nuclear waste disposal, U.S. Nuclear Regulatory Commission (1979) deals with uranium milling and U.S. Atomic Energy Commission (1971) covers the transportation of nuclear materials. U.S. Office of Science and Technology (1972) includes some very interesting analyses of the effectiveness of safety features. Although these do not deal with the nuclear industry, the methods may be applicable.

References Most Useful to AECB

Doern (1978), Williams (1980), the reports of Commissions of Inquiry listed above and the U.S. Government reports provide most of the information of particular interest to AECB. AECB has published its own evaluations as well (e.g. Pannell and Campbell, 1980; Domaratzki, 1984).

D2.6.4 Technology Assessment

The evaluation of new technology or the comparison of alternative technologies is a complex subject and somewhat peripheral to the subject of this review. It can be important in nuclear regulation when technological advances are made. Miller (1969) reviews some of the problems involved. Commissions of Inquiry into accidents such as the various studies of the accident at Three Mile Island (United States President's Commission 1979a and b; Gorinson, 1979; Pannell and Campbell, 1980), the Royal Commission on the Ocean Ranger Marine Disaster (1984) and Grange's (1980) report on the accident at Mississauga all investigate what happens when technology assessment fails and make recommendations on how to avoid future failures. Reid Crowther and Partners (1980) review technologies for use in waste management and Kilborn and Beak Consultants report on an actual assessment of alternative technologies with regard to management of uranium mill tailings. Burn (1967) evaluates and compares nuclear technologies and regulatory philosophies in the United States and Britain. These references are all of interest to AECB.

Reviews of patent applications with relevance to the nuclear industry is an AECB responsibility that is, at least in part, a form of technology assessment. The symposia edited by Sviridov (1981) and Marcy (1978) provide much technical information useful to evaluators. Globerman and Rothman's (1983) study of Canadian Trade Mark regulation deals with a subject that has many parallels to patent regulation. Some of the methods used in that study could be used in an evaluation of Canada's patent system.

References Most Useful to AECB

Technology assessment is a vast subject amd we cannot claim that the few references quoted here are representative - only that they are useful. There is a very extensive literature on the effectiveness of air pollution control technology, for example, that we have not had time to examine. It may well include references that illustrate the use of methods of interest to AECB. The references on patents were the most useful encountered.

D2.7 Inspection and Enforcement

Papers on this subject fall into three groups by objective : those concerned with regulatory compliance and enforcement; those concerned with physical security; and those concerned with information control and nuclear proliferation. Naturally there is some overlap between the last two as physical security contributes to information control.

Maybee (1984) presents the design and methods of an evaluation of the entire range of regulatory inspection by the New Brunswick Government. Blewett et al. (1985), in an impressive evaluation of Fisheries Act inspection and enforcement for DFO, illustrates the application of a variety of advanced methods. Harrald et al. (1979) deals with the effectiveness of a marine pollution abatement program. The Royal Commission on the Ocean Ranger Marine Disaster (1984) evaluates implementation of safety regulation.

There are a number of examples specific to nuclear regulation. Ishack (1981) describes some of AECB's safety inspection procedures and their rationale. Muller (1977) evaluates the U.S. Nuclear Regulatory Commission's quality assurance program and the Commission itself (1975) has published a detailed evaluation of reactor safety which employs many useful quantitative methods. Organisation for Economic Cooperation and Development (1977) evaluates nuclear plant inspection practices and Stevenson and Thomas (1983) review recent advances in safety research. Doern (1978, 1976) places inspection and safety issues in a Canadian political context.

Much of the quantitative evaluation of inspection and enforcement has been aimed at criminal law and policing. An early, but comprehensive, review was undertaken by the United States President's Commission on Law Enforcement and the

Administration of Justice (1967). Scarff (1983) compares the effectiveness of gun control legislation in Canada before and after changes in the law in 1977. Wright et al. (1981) reviews similar investigations in the United States. Baker and Meyer (1979) and Engstad and Lioy (1980) deal with the effectiveness of policing and police productivity. Although some of the methods used in these studies are applicable to AECB, it is necessary to understand some fundamental differences in objective. AECB is primarily concerned with preventing non-compliance and possible consequent adverse impacts or accidents. The police are more-or-less equally concerned with the prevention of crime and the successful apprehension and prosecution of offenders.

In matters of physical plant security and information control, AECB's enforcement objectives are likely to be more similar to those of the police. International Atomic Energy Agency (1974) deals with methods of surveillance around nuclear plants. Australia (1979) deals with protective security in general, but it gives specific attention to the threat of terrorism and other concerns for public safety as well as dealing with more routine regulatory compliance.

One of the major issues in nuclear security is the question of nuclear proliferation. AECB's responsibilities are discussed by Jennekens (1981). Technical problems and control methods are reviewed in Chayes and Lewis (1977), Krass et al. (1983), Stockholm International Peace Research Institute (1979) and Walker and Lonnroth (1983).

References Most Useful to AECB

Papers most useful in designing evaluation of AECB's inspection programs are Maybee (1984) and Blewett et al. (1985) for evaluation methods, and Ishack (1981), Muller (1977), U.S. Nuclear Regulatory Commission (1975) and Organisation for Economic Cooperation and Development (1977) for technical details of inspection practices of the nuclear industry. Australia (1979) and International Atomic Energy Agency (1974) are useful references on security matters. All the references on nuclear proliferation are of interest.

E : INTEGRATION AND USE OF RESULTS

The results of the literature search with respect to this subject were disappointing. While there are many references describing the context into which evaluation results are injected, and typical behavioural reactions to them, little beyond common sense is offered in the way of advice on how to improve acceptability and applicability.

E1. Evaluation in the Context of Program Management

It is self-evident that AECB evaluation results must be made available in a form suitable for use by, or incorporation in, the Canadian government program management system. Treasury Board (1981a) and Hartle (1978) explain just where program evaluation fits in the Canadian Government management scheme. Ontario (1982) explains the place of "Management by Results" in the Ontario government-wide planning and control process. Lyden and Miller (1978), Poland in Hyde and Shafritz (1979) and Steiss (1982) provide the same kind of information for the United States and Keeling (1972) for the U.K. Jordan and Sutherland (1979) does this for three countries. Rossi *et al.* (1979) include political realities in their analysis.

Many authors review the obstacles to implementation of program evaluation results, (e.g. Doern and Maslove, 1979; Hall, 1980) or the limits of achievability (e.g. Jackson, 1982; Wilson, 1980; Zammuto, 1982). Unfortunately few offer specific advice on how evaluation results should be presented or in what sort of terms they should be couched. Perhaps this explains why Stanbury and Thompson (1982) find that, in spite of many efforts at evaluation and regulatory reform in Canada, little has been achieved. Organizations can change, however, as Mazmanian and Nienaber (1979) have described. They examined changes made by an organization generally thought to be very conservative, the U.S. Corps of Engineers, to accommodate new public attitudes to environmental protection. How can constructive changes be brought about ?

Treasury Board appears to take the approach that evaluation results are simply provided to Deputy Heads and other senior managers and that appropriate use will somehow be made of them. The literature is full of references that suggest that this is a naive approach, although few of these are Canadian. Hicks (1981) does include some rather mild observations by Dobell and Zussman on the organizational and political context into which evaluation results are injected. The observations mainly concern the defensive reactions of senior public service managers to program evaluation. The solution recommended by Dobell and Zussman is externally commissioned evaluations instead of the present wholly internal system. ECC (1979) recommends publication of results and legislative review. The Australian Royal Commission on Public Administration (Australia, 1976) and Avery in Clark *et al.* (1980) discuss the situation in Australia and the United

States in much blunter terms. External evaluation is not an option open to AECB.

E2. Improving the Acceptability and Applicability of Results

Many evaluation textbooks or collections of papers on evaluation deal with the difficulty of making the results of evaluation acceptable. Treasury Board (1981b) does recommend a format for evaluation reports and Grinnell (1982) and Hatry et al. (1973) also offer advice on how to present and disseminate evaluation results in an acceptable manner. Chubb (1983), perhaps most clearly, analyses the political and organizational agendas of politicians, public servants and interest groups involved in regulation. Weiss in Hyde and Shafritz (1979), Hall (1980), Rossi et al. (1979) and Stewart and Garson (1983) also deal with behavioural obstacles. Wildavsky in Hyde and Shafritz (1979) identifies the root of the problem in suggesting that : "The nature of organization stresses stability while evaluation harbours continued changes; hence incompatibility is manifest". Mushkin, in the same volume, suggests that evaluators are not often aware of the sensitivities on which their conclusions may trample. Palumbo and Nachmias (1983) argue that evaluators should be realistic about how organizations make decisions and should take this into account in framing their recommendations. Of course, if the commissioner of an evaluation has sufficient authority more direct measures are possible (e.g. United States Executive Office of the President, 1985). This is not always the case. The U.S. General Accounting Office (1984) recommends continual consultation throughout the process of evaluation to improve acceptance of recommendations.

The American literature places great significance on the political context of evaluation (Weiss, 1972; Weiss in Hyde and Shafritz, 1979; and Connor et al. 1984) and the values assumed by participants in the process (Borich and Jemelka, 1982). They also make recommendations to evaluators about how to deal with these complexities (Wholey in Freeman and Solomon, 1981; Rossi et al., 1979; Zammuto, 1982; Patton, 1980; Austin and Associates, 1982). Britain (1981) also attacks the problem with specific reference to technological change. Prominent amongst this advice is the need to accurately indicate the confidence that can be attached to evaluation conclusions, and the need to word the conclusions, and any interpretation offered, so that it is not only unambiguous but not susceptible to subtle or not so subtle reinterpretation. Also emphasized is the need to restrict recommendations to what is practically feasible. Palumbo and Nachmias (1983) and Jackson (1982) offer advice on what the limits of feasibility may be. Some of the references in the sections of the bibliography dealing with organizational behaviour offer insights that might be useful. Stewart and Garson (1983), for example, refers specifically to the nuclear industry. One Canadian reference, ESSA (1982), discusses how evaluation results are perceived by various groups and how they may come to be accepted. ESSA also offers advice on how to promote acceptance of results. This may be even more useful to commissioners of evaluation than to evaluators.

There are two documented examples in the bibliography of how changes were successfully made. Ontario (1983) deals with the implementation of the transition to new legislation in the trucking industry. Mazmanian and Nienaber (1979) describe changes in the U.S. Corps of Engineers in response to changes in environmental policies.

Some authors stress that to be effectively integrated into program management, evaluation has to be either continuous or repeated at frequent intervals (e.g. Zammuto, 1982). This is one of the major recommendations of the Economic Council of Canada (1979) which clearly influenced the Treasury Board (1981a and b) approach to evaluation. ECC also showed some insight into the politics of evaluation. It recommended : (i) the publication of evaluation reports and the encouragement of public scrutiny; (ii) the audit of selected evaluation reports by a central office; and (iii) legislative review of evaluations because of the political issues likely to be raised by them. ECC believed that legislative review would increase the chances of action on political issues that would be beyond the mandate of public service managers. Jordan and Sutherland (1979) thought that legislative review would reduce the likelihood of action in response to evaluation results because of the greater freedom of program managers to act. Either could be correct. According to the papers in Hicks (1981) program evaluation in Canada has not yet brought about significant changes in management of programs.

References Most Useful to AECB

The Treasury Board (1981a) guide sets out the context of evaluation in the Government of Canada. Chubb (1983), Hyde and Shafritz (1979), Freeman and Solomon (1981), Jackson (1982), Hicks (1981) and ESSA (1982) all include information useful to an evaluator framing recommendations and presenting results. Economic Council of Canada (1979) and Zammuto (1982) are useful sources on the integration of the evaluation function into program management.

CHAPTER IV : APPLICABILITY OF EVALUATION TO AECB PROGRAMS

Tasks 3 and 4 in the work specifications for this project call for the review of AECB regulatory decisions and the identification of relevant and suitable methods that could be used for the evaluation of the AECB Regulatory Program. Task 3 was completed by reviewing a large number of regulatory documents and supporting material provided by AECB, and by discussions with Board staff. It provided the information base about AECB programs that was necessary to assess the applicability of evaluation methods. The document review also demonstrated that many pieces of work already undertaken by AECB are evaluative in nature or include evaluative components. These are likely to be of assistance in any formal program evaluations.

In Chapter III we reviewed the literature on program evaluation in a general context by following the steps required to complete an evaluation. In each subsection of that review we identified the references of most interest to AECB. In Task 4 we seek to go beyond this by considering methods applicable to AECB's regulatory program in greater detail. Carried to its logical conclusion this would mean conducting what Treasury Board calls an evaluation assessment and what we have called the first three steps in evaluation. An evaluation assessment is beyond the scope of this project, but it is necessary to go some distance towards one to provide a useful response to Task 4. Applicable methods cannot be identified without an understanding of AECB's goals, its program activities and their organization, and the major problems or issues with which it is confronted.

After consultation with Board staff it was decided to follow the steps in program evaluation once again, by : defining the context of AECB evaluations; setting out AECB objectives, program activities and generic issues to the extent necessary to recommend evaluation methods; and reviewing the applicability of methods at an appropriate level of generality. It was recognized that to carry this analysis to the level of detailed evaluation of program components would require a full scale evaluation assessment.

A : INITIATION AND COMMISSIONING OF PROGRAM EVALUATION

As observed in Chapter III, the commissioning of evaluation is perhaps the most important step of all because it defines, or should define, the perspective, values and scope of the evaluation. Any program evaluation carried out by or for AECB will fall under the Treasury Board specifications as set out in the Guide (1981a) and Principles (1981b), although it is not yet clear to what extent the Treasury Board's (1985) draft paper on the evaluation of regulatory programs will influence actual evaluations. Nevertheless there is a body of policy and practice, what might be called the Treasury Board system, which will strongly influence the conception and design of AECB program evaluations. In this section of our report we attempt to define the requirements of the Treasury Board system and to identify where other approaches or ideas might come into play.

A1. Perspective of Evaluations

The Commissioner of Treasury Board-style evaluations is the "Deputy Head". In the case of AECB this is the President. The results of Program Evaluations are intended to assist the Deputy Head (and Treasury Board) to improve program management. This feature of the Treasury Board system effectively determines the perspective of evaluations. They are internal, not only to government, but to the public service. They reflect, quite naturally, the point-of-view and preoccupations of senior public service managers. Many references included in the bibliography (e.g. Australia, 1976) make the generalization that senior public program managers tend to be consolidators rather than innovators, i.e. that they are more interested in program improvements than in considering program alternatives. This is likely to influence the perspective of evaluations commissioned by a Deputy Head unless he or she makes a deliberate effort to avoid it. Perhaps because of this, the Treasury Board Guide (1981a) stresses the need "to challenge the very existence of a program" and to consider alternative ways of meeting its objectives. When commissioning an evaluation the Deputy Head and his advisers must decide how far an evaluation should go in this direction.

There is no specific method of making this decision. What it requires is a penetrating analysis of the reasons, apparent and real, for undertaking the evaluation and this can only be done by the person or persons commissioning it. There are, however, many references in the bibliography which offer examples of the kinds of considerations that may come into play. Doern and Maslove (1979), Hartle (1978), Dobell and Zussman in Hicks (1981) and Jordan and Sutherland (1979) review the subject in the context of the Treasury Board system. The papers by Poland and Weiss in Hyde and Shafritz (1979) discuss analogous situations in the United States and their observations are certainly applicable to Canada. They demonstrate that every evaluation has a political context and a political stance, regardless of whether or not these are made explicit. For productive evaluation, at least the commissioner of the evaluation and the evaluator should know what these are. Among evaluation texts Borich and Jemelka (1982) and Zammuto (1982) deal with the subject in some detail.

"Political" is used in the previous paragraph to cover politics within an organization and the politics of struggles between organizations within an overall government structure. Notwithstanding the internal perspective of evaluations commissioned by Deputy Heads, political considerations of a philosophical or even partisan nature can also influence that perspective. Deputy Heads are not likely to be insensitive to the political agendas and priorities of the Government in power. For example, our present Government has made statements about the control or reduction of federal expenditures and launched initiatives such as that of Nielsen (1985) that seem certain to influence the perspective of evaluations. Once again we can recommend no formal method of taking such factors into account when commissioning evaluations, because none exists. Any responsible Deputy Head will, no doubt, include them in his or her definition of the perspective of any program evaluation.

A2. Values in Evaluation

Discussion of politics and evaluation leads naturally into the subject of the values, premises and criteria that underlie any evaluation. The rather extensive literature on the subject is reviewed in Chapter III-C2 of this report. That review provides many references to papers which discuss the values that are embraced by evaluators of regulatory programs in Canada and the United States and the relationship of these values to prevailing political attitudes and changes in those attitudes.

As noted in the review, the Treasury Board (1981b) avoids explicit treatment of values. It stresses instead the importance of objectivity which implies "value-free" evaluation, something many authorities on evaluation say cannot exist. The Treasury Board approach to evaluation does, in fact, assume certain values and these are discussed somewhat more explicitly by Rutman (1980). This avoidance of the subject of values is unfortunate because the balance of opinion in the literature overwhelmingly favours the view that values are of critical importance to evaluation, and that they should not only be identified but thoroughly reviewed before evaluation proceeds. At least some guidance in this respect should be provided to evaluators by those commissioning evaluations, if results that can be applied within the existing political and administrative context are desired.

Because Treasury Board does not offer advice on the subject of values, it must be sought elsewhere. Economic Council of Canada (1979), Law Reform Commission (1980), Vandervort (1979), Reschenthaler (1972) and Science Council of Canada (1982) all define values they consider appropriate to the evaluation of regulatory programs in Canada. These are reviewed in Chapter III-C2 and provide a starting point for the consideration of any commissioner of evaluation. The literature also offers much more complicated and technical methods of analysing and incorporating values in evaluation.

Borich and Jemelka (1982) provide a comprehensive analysis of the importance of values in evaluation. They consider not only the values of evaluator and commissioner but also those of all parties involved with a program, i.e. managers, legislators and those affected directly or indirectly by the program or the activities it is intended to regulate or control. These values are important in the process of evaluation because they affect program execution and the perception of program execution by those affected. Values embraced by evaluators or acted upon by program participants are not always overt or explicit and they may sometimes differ in action from what is publicly stated. Borich and Jemelka describe a variety of methods of determining what these values are. They list 17 sources of oral or written information about programs that may be diagnostic of the speaker's or author's values. Five methods of validating the information obtained from these sources are described. These are all labour intensive and require the use of highly skilled and experienced professionals. They are therefore likely to be rather costly. Nevertheless, in programs where there are likely to be substantial differences in values among those concerned with the program, an ignorance of these differences can prevent effective evaluation. Borich and Jemelka in fact go on to describe several methods of program evaluation that are value oriented. These are mentioned in our bibliographic abstract in Chapter II.

For internal evaluations of AECB programs the question of values is unlikely to be one that justifies the expenditure of much effort or funds. The commissioner of evaluations and the program managers and their staff share the same broad values, even if these remain at least partly unstated. They may have to be made clear to an outside evaluator if one is employed. However, if AECB's evaluations are to include canvassing of opinion of others with an interest in AECB programs, identification of the values espoused by the surveyed groups may be essential. Without this understanding, evaluation results may be misleading or erroneous. In these circumstances expenditure of effort and funds on discovering what these values are is desirable - in proportion to the magnitude of the differences in values and their consequent influence on evaluation results.

A3. Scope of Evaluation

The commissioner of any program evaluation normally defines the scope of the evaluation. Treasury Board (1981a) provides a list of evaluation questions that focus principally on program objectives, impacts and alternatives, but are also concerned with duplication and overlap and cost-effectiveness. The list is reproduced in Chapter III-A1. In practice, the questions dealing with program alternatives have not been as directly addressed as the others because the action required to introduce such alternatives lies beyond the authority of those commissioning evaluations. Although this appears to be changing under the influence of prevailing political opinion, the Treasury Board system has, in the past, tended to focus on efficiency and effectiveness and to consider alternatives only for program components rather than for entire programs.

For the same reason, Treasury Board-style evaluations have not generally considered the political and legislative component of programs because the responsibility for that lies to a large extent beyond the authority of the Deputy Head. Thus many of the aspects of regulatory programs considered by the Law Reform Commission (e.g. Slatter, 1982; Vandervort, 1979) would be unlikely to be included in a Treasury Board-style evaluation.

In its draft paper on evaluation of regulatory programs, Treasury Board (1985) identifies 23 basic issues. Thirteen of these concern program impacts, are essentially economic or socio-economic in nature, and are consistent with the general Treasury Board approach. Six concern the rationale for government intervention and four deal with alternative methods of achieving the government's goals. This demonstrates a considerable interest in matters that go beyond the authority of the Deputy Head and suggests that, at least in the evaluation of regulatory programs, the scope of evaluation should be broader than it has been in practice.

Another feature of the Treasury Board system that has made it difficult to deal with major rationale and program alternative issues in the past, is the continuous evaluation approach whereby parts of a given program are identified for evaluation each year with the objective of covering the entire program in, say, a five year cycle. This has tended to focus attention at the scale of these program components, so that rationale issues affecting the entire program are overlooked. Treasury Board (1985) suggests that this omission has not gone unnoticed. A commissioner of evaluation must therefore consider evaluation of an entire program as well as its components or activities. As will be seen later, this is a particularly important consideration for AECB because of the nature of its program and objectives.

A final matter to be considered by a commissioner of evaluation in defining scope is whether or not an evaluation should deal specifically with certain objectives or in general with all program or program component objectives. This is an important decision because it may influence the choice of method. For example, the effects of exposure to radiation on public health and on the health of workers in the nuclear industry have attracted a good deal of public debate. The President of AECB may decide that an evaluation of the Board's program with respect to health objectives should be undertaken. The scope of such an evaluation would therefore be rather specific. In fact, AECB has undertaken a number of extensive scientific studies of health effects in relation to exposure to radiation. These have contributed to reviews of the relevant regulatory standards and to proposed changes in allowable exposures. They are evaluative in nature, although not formally recognized as program evaluation.

Under the Treasury Board system the identification of evaluation issues normally takes place as part of an evaluation assessment. A Deputy Head may commission an evaluation assessment before deciding on what issues should be covered in the evaluation study which follows. This step, which is discussed under B and C below, may be omitted when major issues must be immediately addressed.

A4. Recommendations

1. It should be recognized that AECB program evaluation occurs within the Treasury Board system. The perspective is therefore internal to the public service and the "client" of the evaluation is the President of the Board. Further specification of perspective is available from the "fundamental questions" identified in the Treasury Board Guide (1981a) and the "basic issues" tabulated in the Treasury Board (1985) draft paper on evaluation of regulatory programs.

2. The commissioner of an evaluation should identify the values to be used as evaluative criteria. Because Treasury Board does not explicitly address the matter, Law Reform Commission (1980), Economic Council of Canada (1979), Vandervort (1979), Reschenthaler (1972) and Science Council of Canada (1982) should be consulted if necessary to assist in defining values. If difficulties are encountered, Borich and Jemelka (1982) offer elaborate and expensive but effective methods.

3. The commissioner of an evaluation should define its scope in terms of whether the entire program or certain components are to be evaluated and what major issues are to be discussed. Some guidance is available from the Treasury Board publications referred to under Number 1 above. Where necessary, an evaluation assessment should be used to help define basic issues. I.D. Systems' (1984) assessment of DIAND's northern environment program is a good example, but in a less complex program, a simpler, internal assessment may suffice.

B : THE DESCRIPTIVE STEP

The second step in program evaluation is the detailed description of the program under study. Chapter III-B reviews methods of description and descriptive modelling in detail. It distinguishes between impact-oriented models and process-oriented models and emphasizes the hierarchical nature of models which can be expanded to the level of resolution required.

B1. Logic Diagrams

Treasury Board recommends the use of logic diagrams, a form of impact-oriented model of programs. Instructions about how to complete a logic diagram are to be found in the Treasury Board Guide (1981a) and in the draft paper on regulatory programs (1985). The latter includes several examples. Most reports of evaluations carried out under the Treasury Board system include such diagrams.

Construction of a logic diagram is a useful part of program description. It can be constructed by program staff relatively easily and it provides a useful tool for planning more detailed evaluation. Figure 5 (page 198) is an unofficial logic diagram of the AECB program. We constructed it by examining documents such as AECB's annual estimates, its multi-year operational plan, the AECB (1983) description of the Board's regulatory program and by brief consultation with Board staff. It is not in any sense a final or authorized diagram, but it does give a general idea of the Board's activities. It can also be used to illustrate the advantages and limitations of the approach.

The advantages of logic diagrams are : (i) they show the flow from legislative mandate through activities to results; (ii) it is easy to determine where the bulk of program work takes place and where the bulk of program resources are expended; and (iii) by examining the links in the diagram it is easy to identify generic evaluation issues and to get a general idea of their probable importance.

For example, in Figure 5 it is evident that a large proportion of AECB work and resources are concentrated in one box - licensing. It is also evident that a large part of the Board's objectives are eventually realized through standard-setting, licensing, inspection and compliance. Many activities are channelled through these program elements. Finally, it is clear that a great deal of interaction between the Board's activities is required to bring about the desired program results.

Logic diagrams may provide an adequate descriptive base for evaluation of programs with simple objectives, and results that can be easily measured. This is not generally true of regulatory programs. In their case, logic diagrams are not detailed enough to deal with the complexity of the regulatory process or its results. The reason for this is, in fact, the principal disadvantage of the Treasury Board logic diagram. The diagram illustrates objectives and traces their origin, but it deals with how objectives are achieved in only a very superficial manner. To understand, and ultimately evaluate, how AECB achieves its objectives a much more detailed descriptive model of its activities is necessary. This would be a process-oriented model. By the same token, if evaluation objectives were to assess the impacts of AECB's regulatory activities on the nuclear industry, on international peace and security or on health, safety and environment, a more detailed impact-oriented model would be required.

B2. Other Descriptive Models

Figures 2, 3 and 4 (pages 195-197) are generalized examples of other types of process- and impact-oriented models that could be usefully applied in certain kinds of evaluation of AECB programs. Examples of these kinds of models are reviewed in Chapter III-B4 and references to more elaborate methods of model construction are included. It is important to note that descriptive models do not need to be represented diagrammatically. The Law Reform Commission (1980) approach to description of regulatory programs shows this clearly.

What is required to construct descriptive models ? An intimate knowledge of the actions taken to implement a program and of the interactions and consequences of these actions is all that is required. Such models can therefore be constructed by program staff with a relatively small commitment of resources. In fact, AECB has already produced descriptive models of parts of its program in the normal course of doing its work, e.g. Asmis (1981), AECB (1983), Gummer (1982), Ishack (1981), Joyce (1981), Marchildon (1983)and SECOR (1984).

If more formal or elaborate models are needed, reference can be made to examples from the literature that deal with programs similar to AECB (see Chapter III-B4) or to standard textbooks on systems modelling. Borich and Jemelka (1982) include a lucid appendix on how to construct systems models of programs for evaluation purposes.

The advantage of producing descriptive models that is most often cited is their ability to help focus attention on exactly how a program functions. This facilitates the framing of questions to be asked by evaluators. However, the models are not only descriptive tools. Constructing a model forces the author to analyse how the program functions. This often identifies potential problems, inefficiencies or obstacles to the achievement of program objectives or, more generally, the key actions that determine how well program goals will be met. It can be an economical and effective method of evaluation itself. The disadvantage of producing detailed descriptive models is that, if judgement is not exercised, it is possible to become preoccupied with examining how things are done at the expense of considering why they are done, whether they are being done efficiently and whether they are producing the desired results.

B3. Recommendations

1. The construction and use of a Treasury Board-style logic diagram is virtually mandatory. It is also worthwhile as a tool in evaluation assessment.
2. For a regulatory program such as that of AECB the construction of other, more detailed descriptive models (both process- and impact-oriented) is likely to be very useful in planning evaluations. The models are also useful as evaluation tools because they stimulate program analysis in the course of their construction.
3. If resources are available, such descriptive models should be produced internally. The benefits of this in planning and conducting evaluations may be significant, particularly in ensuring that program managers' concerns are addressed. In addition, the involvement of program staff in evaluation activities may improve acceptance of evaluation and its results.

C : ISSUES AND QUESTIONS

The general approach recommended in the literature review and by Treasury Board is to search for issues and questions, then select from these the key questions that encapsulate the objective of an evaluation. Generic issues may be found by literature review, by examining logic diagrams or by reviewing more detailed information about program mandates, objectives and activities. The list of issues that follows is a product of our literature review, but it is not intended to be exhaustive.

C1. Types and Sources of Issues

It is appropriate to begin with Treasury Board advice on this subject. In the 1985 draft paper, Treasury Board recognizes three types of issues : rationale and impact issues and program alternatives. The analytical thought behind this classification is clearly economic. However, other discipline interests must also be considered. These are reviewed in Chapter III-C3. Lacking from the Treasury Board list are issues related to the conduct of the regulatory process in accordance with the accepted standards of society, (see for example Law Reform Commission, 1980). We recommend an additional category of process issues to include all matters concerned with the conduct of the regulatory process. The Treasury Board list is also lacking (i) in issues reflecting political science concerns as, for example, discussed by Doern (1977b); (ii) in professional scientific and technical issues relating to the quality of decision-making, for example Science Council of Canada (1982); and (iii) in issues related to organizational behaviour, for example Stewart and Garson (1983). These would fall into the four categories listed here, except for organizational issues for which we have created a new category.

C1.1 Rationale Issues

Treasury Board (1985) lists six issues of this type :

1. What is/was the rationale for government intervention in this area ?

2. Why does the government intervention take the form of a regulatory program (instead of an expenditure program, direct ownership or a tax program) ?

3. To what extent are the objectives of the government intervention still relevant ?

4. To what extent is regulation _per se_ still required ? (What would happen if the program ceased to exist ?)

5. What evidence is there that the conditions or assumptions justifying the need for regulation are still valid ?

6. Are the activities and outputs of the regulation consistent with its mandate and plausibly linked to the attainment of the objectives and the intended impacts and effects ?

We would add these somewhat more detailed items :

7. Have the objectives of the program evolved without Cabinet or Parliamentary sanction so that they no longer conform to the official mandate ?

8. Is the method of accountability to Cabinet and Parliament working effectively enough to allow them to review rationale and results ?

9. (Supplementary to #2 above) Is the form of regulatory program (e.g. Department, Independent Regulatory Agency, Commission, Interdepartmental Review Committee etc.) the appropriate one ?

10. Is there too much overlap in objectives and mandate with other governments, departments or agencies and is a rearrangement of responsibilities desirable ?

This last subject is mentioned by Treasury Board (see #12 below), but only in terms of impacts on and by other programs.

C1.2 Impact Issues

Treasury Board (1985) lists 13 more of this type, but we have reassigned some to other categories and included others in broader issue statements. Those that we consider impact-oriented, we have slightly reworded as follows :

11. What impacts and effects, both intended and unintended, resulted from implementing the regulation ?

12. In what manner and to what extent does the regulation make possible, support, duplicate or work at cross-purposes with other activities carried out by the private sector, provincial governments, the federal government or other national governments and international organizations ?

13. In what manner and to what extent were appropriate regulatory objectives achieved as a result of the regulation ?

14. What are the societal costs of the regulation ?

15. What are the private sector costs of the regulation ?

16. What effect does the regulation have on the productivity and profitability of the regulated parties ?

17. What effect does the regulation have on the quality, Canadian content or nature of the regulated product or service, or the standard of performance of regulated parties ?

18. What are the attitudes (perceptions) of the regulated parties toward the regulation ?

19. Does the regulation have the effect of placing different burdens (or conferring different benefits) on different parties in the same regulated sector (example : small vs. big business) ?

Some of these issues are really more specific statements that could be included under issues 11, 13, 14 and 15. They also stress economic effects. If impacts and the achievement of objectives are to be elaborated as generic issues, the elaboration should extend to other types of objectives as well :

20. Is protection of human health and safety, and the environment, effective enough to meet program objectives ?

C1.3 Process Issues

A few of the issues listed by Treasury Board (1985) as impact issues seem to us to fit better in this category. The list that follows was assembled from the references reviewed in Chapter III-C. Economic Council of Canada (1979), Law Reform Commission (1980), Doern (1976) and Doern *et al.* (1977) were particularly useful.

21. Is the application of regulation through the regulatory process conducted to the standards considered acceptable by Canadian society (consistency, fairness, honesty, provision of reasons for decisions, other elements of due process) ?

22. Are regulated parties and those affected by the results of regulation kept informed, afforded the opportunity to make representations or, if appropriate, to participate in the process ?

23. Are the decisions, approvals, interpretations, rules and other products of the regulatory process generated in a timely and efficient manner ?

24. Is the quantity and content of information and participation in the regulatory process required of the regulated parties commensurate with its use in reaching decisions ?

25. Is the quality of professional scientific and technical input to, and participation in, the regulatory process adequate ?

26. Is the need for scientific technical and regulatory research being met, and met efficiently ?

27. Is the process of preparation and drafting of subordinate legislation and regulatory documents effective ?

28. Is the process of setting regulatory standards or drafting license terms and conditions producing results that contribute to achievement of program objectives ?

29. Are inspection and other methods of securing compliance (a) successful in achieving their objectives and (b) cost-effective ?

C1.4 Organizational Issues

These issues are not explicitly addressed by Treasury Board (1985).

30. Could changes in program structure and function improve effectiveness ?

31. What staff skills and experience are necessary at all levels to deal effectively with program tasks and are they available within (a) the current complement and (b) establishment ?

32. Is communication of information (policy, regulatory practice and technical information) among program staff efficient ?

C1.5 Program Alternatives

Treasury Board lists the following :

33. What are the alternatives to the regulation ?

34. Is there a non-regulatory alternative that would be more effective in achieving the objectives and intended impacts ?

35. From the perspective of the agency delivering the regulation, are there more efficient regulatory alternatives that would achieve the objectives and intended impacts and effects ?

36. From a societal perspective, including all private and public sector costs, are there more efficient ways of delivering the existing regulation ?

C2. Deciding Which Issues Are Most Relevant to AECB

The rather long list of generic issues in the previous section can be somewhat reduced if the evaluation of AECB programs under the Treasury Board system is specifically considered. First of all, the internal perspective of Treasury Board-style evaluations means that some issues are beyond the responsibility of the commissioner of evaluation and should more properly be dealt with by a central agency, such as the Privy Council Office, or at the political level. This is true of some of the rationale and alternative items. Secondly, examination of the logic diagram and other descriptive material about the program, and consideration of where resources are expended and what effects are produced, can eliminate some issues as of trivial significance in a particular program. Finally, further considerations of the same material will show that some issues can be very simply and factually addressed by program staff so that they do not require expensive evaluation studies.

It should also be noted that this kind of examination can turn up new issues, as shown below.

We have briefly reconsidered the list of issues in the previous section in the manner described above and reached the following tentative conclusions.

The rationale issues 1, 3, 4, 5, 6, and 7 can be dealt with very easily by Board staff using existing information, much of which is included in existing AECB documents and publications. AECB staff could also respond to #2 with information from the Board's history as summarized by Sims (1980). Issues 8-10 may merit greater scrutiny by those planning and commissioning AECB evaluations or conducting evaluation assessments.

Impact issues all appear to be more-or-less appropriate to AECB evaluations although #14 requires further definition. AECB has already carried out a great deal of analysis of program impacts both internally and through contractors.

Process issues also appear relevant to AECB's program. Examination of the logic diagram (Figure 5, page 198) shows that most of the regulatory activities pursuant to legislation proceed through approval processes and funnel through setting standards and license conditions, inspection and compliance. This suggests a further generic issue that is specific to AECB :

37. Are requirements under the various Acts being effectively coordinated through the approval, licensing, standard-setting and inspection elements of the regulatory process ?

The organizational issues 30-32, all appear relevant to the evaluation of AECB's program. They are sufficiently complex and sensitive that evaluation by Board staff would probably be impractical.

Of the issues concerning program alternatives, 35 and 36 appear applicable to the AECB program. Issues 33 and 34 may be somewhat beyond the normal responsibility of the President of the Board. They are also of somewhat doubtful relevance in the case of most of the Board's regulatory mandate. It is hard to believe that Canadians would be willing to accept a non-regulatory approach to nuclear radiation. A fairly elaborate evaluation would be required to deal with issues 33 and 34.

There are more elaborate methods of identifying evaluation issues and defining evaluation questions (section 3 below). They involve seminars, workshops, the use of the "delphi" method by knowledgable program participants and similar methods normally associated with the practice of systems analysis. They are discussed in the literature review Chapter III-C3, and ESSA (1982) is cited as an example of a Canadian application. In our opinion these methods are unnecessarily elaborate and costly for a relatively simple regulatory program such as that of AECB except, perhaps, for some of the technical questions related to health, safety and environmental effects.

C3. Defining Specific Evaluation Questions

The next step in an evaluation assessment is to identify and phrase a set of questions that define the issues specifically in the context of the subject program. One of the best examples of transforming the Treasury Board's generic issues into specific evaluation questions is to be found in the evaluation assessment of DIAND's northern environment program by I.D. Systems (1984). The methods used began as recommended here with : "(i) terms of reference for the evaluation assessment; (ii) analysis of the program profile"; and continued with "(iii) review of previous related evaluation studies; (iv) analysis of program and activity documents; and (v) conduct of a large number of personal interviews with a variety of key informants". The persons interviewed included : "A wide cross-section of program participants, clients and stakeholders".

This is a standard and effective approach. The most costly part of an evaluation assessment is the interview portion, but its magnitude and the extent to which it is necessary will vary with the program and the scope of evaluation. For example, an evaluation assessment of program organization and internal communications would probably not require an interview program beyond program staff. Any interviewing required for it could probably be combined with the conduct of the later stages in the evaluation.

Defining more specific questions about program rationale and alternatives is very dependent on the scope of the evaluation. The content of the questions usually reflects an external imposition or requirement rather than a matter of detail arising from the particular properties of a given program. One source of examples of specific questions is the sunset reviews carried out in the United States (e.g. U.S. Department of Energy, 1982). These concentrate heavily on assessing what would happen if the programs ceased to exist. Specific questions about program alternatives will be determined by the nature of the alternatives that are not excluded from consideration by the scope and perspective of the evaluation, as defined by its commissioner.

Questions springing from program impact issues may be definable by examination of the logic diagram. In the case of AECB, some more specific phrasing related to achievement of the ultimate results may be readily achieved. For example : what is the incidence of : (a) exposures to radiation exceeding stipulated levels; and (b) radiation-related health effects; among Canadians working in the nuclear industry and the general public ? Is it changing ? AECB has, in fact, looked at these questions as can be seen in the Board estimates and annual report, and in its research contracts in the area of health and radiation. Some impact issues may require the use of more detailed impact models. This may involve separate attention to individual components of the nuclear industry (mining, milling, fuel processing, reactors etc.) or to detailed analysis of how economic impacts are brought about.

Process issues can be transformed into specific questions by examining models of the regulatory process (e.g. Figures 2 and 3, pages 195 and 196). For example, Joyce (1981) provides a detailed flow chart of how AECB regulatory documents are produced. This can be used to pose precise questions about the process. Generic issue #22 might lead to the specific question : "In the consultation process described here, are all interested parties routinely contacted and is sufficient notice provided to allow them to respond ?" SECOR (1984) has, in fact, investigated this type of question for AECB. Generic issue #25 might lead to the question : "How does AECB bring to bear its internal and advisory scientific and technical expertise on (a) drafting and (b) final review of regulatory documents ?" This reflects an issue raised by the Science Council of Canada (1982).

Organizational issues should be relatively easy to transform into questions specific to the AECB program. Adaptation of questions used in standard behavioural and management science texts should suffice. Extensive interview programs should not be necessary for this purpose and a sufficiently detailed knowledge of program structure and function is available from existing documents.

Time and space do not allow further illustrative examples. There are very many in the literature and they are reviewed at length in Chapter III-C4. References appropriate to a type of generic issue or to a particular generic issue can be selected with the aid of the review. They can be helpful in defining specific evaluation questions as part of any evaluation assessment of the AECB program.

C4. Selecting Key Questions

At the end of the exercise described above, it is likely that a large set of questions will be defined. The task of reducing these to a number and scale that would make evaluation feasible will probably seem formidable. However, there are a number of common sense considerations that can be used to reduce the number of questions to a manageable one and to ensure that the most important or "key" questions are retained. These are importance, applicability and cost :

Importance : Is the question central to achievement of the main operational objectives, to major expenditures or to major impacts on regulated parties or the public ?

Applicability : Will the answers to the question be useful in making program management decisions ?

Evaluability : Can the question be answered ?

Cost : Are the time and cost required to answer the question too high in comparison to potential benefits that could be derived from its answers ?

These assessments will be necessarily subjective and may be weighted differently according to individual interests. Use of a matrix to compare assessments of questions may simplify the task of selection. Obviously the questions selected should be those that offer the greatest probability of benefit at the least cost.

C5. The End of Evaluation Assessment

Selection of key evaluation questions marks the end of the evaluation assessment. The results are fed back to the commissioner of evaluation who uses them to decide what actual evaluation will be carried out. For this reason, evaluation assessments often also recommend methods of answering the key questions and include estimates of resources, time and cost required to provide those answers.

The importance of evaluation assessment and the methods it employs are often underestimated. Attention tends to be focussed on the methodological problems involved in answering evaluation questions. If the key evaluation questions are well selected and, most important, carefully phrased, the choice and application of evaluation methods can be made much easier.

C6. Recommendations

1. Identification of evaluation issues should begin with a list such as that provided here. It should be added to by examination of information specific to the program to be evaluated. Reference to papers reviewed in Chapter IIIC and abstracted in the bibliography should also assist in identifying issues and questions. The initial list of issues should be exhaustive to ensure that nothing is missed.

2. Selection of appropriate evaluation issues should take into account the scope and perspective of the evaluation, the logic diagram and other models descriptive of the program, and the magnitudes and distributions of resources expended in the program and of program effects.

3. Specific evaluation questions should be formulated in the context of the scope, values and perspective of the evaluation by using detailed knowledge of program activities and results.

4. Key questions for evaluation should be selected on the basis of importance in determining program results, applicability to program management, evaluability and cost in relation to program costs and magnitude of program effects.

D : METHODS OF ANSWERING EVALUATION QUESTIONS

D1. Approach to Section D

This section of the report deals with what most program managers consider to be evaluation methods. It would therefore appear to be the most important part of the report. In fact, the methods used to complete evaluation assessments are at least as important as those used in evaluation studies. Selection of actual evaluation methods is very difficult unless evaluation questions have been clearly and unambiguously defined. That definition is part of evaluation assessment.

When evaluation questions have been defined, selection of methods can proceed. We have reviewed the utility of the various methods available under three categories : overall approaches (D2), data gathering methods (D3) and analytical methods (D4). In each case we have considered the applicability, advantages and disadvantages of each method, with the AECB in mind. It should be noted that there is some overlap between methods, especially in the economic impact area. In addition, the use of names to describe methods is not consistent from author to author in the literature. Any confusion about what method is intended can be cleared up by consulting the listed references.

D1.1 Applicability

Applicability was assessed using the categories of evaluation issues recognized in Chapter IV-C, i.e. rationale, impact, process, organizational and program alternatives issues. Individual issues from the list in IV-C are mentioned when a method is sufficiently narrow in its application to require that level of detail. Applicability to various program activities was also considered, using the logic diagram (Figure 5, page 198) as a guide.

D1.2 Advantages and Disadvantages

These were assessed by considering the many obstacles that must be overcome by successful methods. We used the following checklist :

- Design Limitations : Data gaps; lack of control; data cannot be validated; inability to generate quantitative data; inability to distinguish program effects from other variation; low participation rates in surveys; need to make questionable assumptions in order to apply method.

- Objectivity : Susceptibility to bias of evaluator or of those providing data.

- Philosophical Values : Inability or failure to take values and perspective into account.

- Financial Values : Difficulties of attributing monetary values to program effects.

- Specificity : Results cannot be extrapolated or generalized.

- Expertise Dependence : Application of method requires high level of expertise and/or experience.

- Intelligibility : Difficult to make results intelligible to laymen.

- Conclusiveness : Method may not offer high level of confidence in results or may yield vague conclusions open to different interpretations.

- Credibility : Method may command credibility because its strengths are familiar; reputation, qualifications and perceived independence of analyst, strength of evaluation design and persuasiveness of conclusions themselves also influence credibility.

- Flexibility in Application : Robust methods are broadly applicable and can accommodate moderate levels of problems outlined here.

- Speed and Cost and Cost Flexibility : Inflexible methods cannot be tailored to meet the level of effort appropriate to the financial scale of the program or its effects, whichever is the determining factor.

- Political Sensitivity : Any method applied to issues or activities where political sensitivity is great must be capable of appropriate response.

D1.3 References

Under each section we have referred the reader to the sections in Chapter III in which appropriate references are reviewed and listed. We have also mentioned individual references that provide good descriptions or good examples of a method. It is worth noting that many references that promise a good deal in their titles, in fact, give little in the way of advice on the selection and use of evaluation methods.

In order to save space and for the user's convenience, we have presented in note form our comments on each method in relation to the points raised above. Absence of comment means that a method has no particular strength or weakness in that area. Comments are necessarily general because each evaluation is different. The interaction between the properties of a particular method, the nature and effects of a program activity and the scope, values and perspective of an evaluation requires that each specific application be reviewed individually.

D2. Evaluation Approaches

D2.1 Conventional Investigation within Treasury Board Guidelines

Applicability

- All issues and program activities.
- Internal perspective may hamper ability to deal with major rationale and program alternative issues.

Advantages

- Flexibility : accommodates all kinds of information and most data gathering and analytical methods.
- Control : easy to focus design on chosen issues and activities and to impose values and perspectives.
- Cost : can be tailored to level commensurate with program impacts and budgetary restraints.

Disadvantages

- Interpretation : criteria for assessment of results are based on ideals and values. People's ideals and values differ.
- Confidence : no control or other basis for comparison makes placing of confidence difficult.
- Subjectivity : difficult to correct for values and assumptions of evaluator or commissioner of evaluation.
- Reliability : difficult to correct for bias or error in information sources.
- Resolution : may be difficult to distinguish AECB impacts from others.

References

Chapter III, sections A1.2, A5, A6, B4.2, C2, C3.2, C4.2.1 and D1.

Treasury Board (1985, 1981a and b), Franson *et al.* (1982), I.D. Systems (1984), Jackson (1982), Law Reform Commission (1981) and Wilson (1980).

D2.2 Comparative Approach

Applicability

- All issues and program activities.
- Limited by availability of comparable cases or data. For AECB, other independent regulatory agencies and other nuclear regulatory bodies offer suitable cases for comparison.

Advantages

- Increased objectivity and reduced concern for data reliability result from comparison with data from the evaluated program's performance in the past or performance data from a comparable program.
- Because values and ideals applied to results of both programs or periods are the same, their influence on interpretation is lessened.

Disadvantages

- Difficulty in finding programs that are sufficiently similar or obtaining accurate data from the past.
- Comparisons of qualitative data can present problems.
- Resolution of program impacts may still be a problem which can invalidate comparison with other programs or other periods, especially where external environment differs.
- Slightly less flexible and controllable than the normal investigative approach.

References

Chapter III, sections B4.2, D1 and D2.2.

Canada Health and Welfare (1984), Mazmanian and Sabatier (1981), Scarff (1983), U.S. General Accounting Office (1984) and Waverman (1982).

D2.3 Experimental Approach

Applicability

- Application limited to programs where impact on regulated public can be varied without severe adverse effects, or to program activities that do not exercise an immediate significant influence on the public.
- Most useful for examining program alternatives.
- Also applicable to organizational and some impact issues.

Advantages

- Confidence that changes in observed program results are attributable to known causes.
- Increased objectivity.
- Less room for alternative interpretations of results.
- Opportunity to introduce more quantitative or semi-quantitative analysis into evaluation.

Disadvantages

- Difficulties of conducting a genuinely controlled experiment in a human social situation.
- Requirement of considerable effort on the part of program staff to carry out the program alternatives being compared. In some cases this will be relatively costly.
- Much reduced flexibility in approach and application.

References

Chapter III, section D1.

Brantingham (1981) and Mazmanian and Sabatier (1981).

D2.4 Meta-Analysis

Applicability

- All issues and program activities.
- Many internally or externally commissioned evaluative studies of AECB's program or elements of the program are available. Most of them were not conceived of as program evaluations but they are none-the-less evaluative.

Advantages

- Allows assessment of influence of values, perspectives and biases on conclusions, leading to greater objectivity.
- Can be used as a cheap and efficient method of provoking reconsideration of evaluation methods and results.
- If used as above, can increase confidence in results and credibility of evaluation.

Disadvantages

- Limited by availability of more than one evaluation of the program. If evaluation is interpreted broadly, this may be less of a restriction than it at first appears.
- Danger of comparing oranges and apples when evaluations are based on different assumptions and use different data sources.
- Can be costly and time consuming if used as a principal, rather than supplementary, evaluation approach.

References

Chapter III, section D1.

Connor *et al.* (1984), Pannell and Campbell (1980), U.S. Office of the Controller General (1980) and Wortman (1983).

Most papers that refer to meta-analysis deal with evaluations that generate quantitative data, but the approach is also applicable to non-quantitative studies. Papers including evaluative material on AECB programs are mentioned in Chapter IV-E below.

D2.5 Sunset Review

Applicability

- All program activities.
- Used to challenge program rationale and alternative issues. For AECB, this approach is relevant only to program alternatives, as abandonment of nuclear regulation is unlikely and transfer to provincial authority would be difficult in view of the transboundary issues involved.

Advantages

- Forces attention to major issues normally beyond the mandate of the Deputy Head. May result in more serious consideration of program alternatives than is usually the case.

Disadvantages

- Focus on potential closure of the program tends to distort responses of program staff and others from whom data is sought and to lead to more expensive, time consuming and elaborate evaluation than might otherwise be undertaken.
- Unless program closure is a real possibility, focussing evaluation on it wastes time and money.

References

Chapter III, sections C4.2.1 and D2.4.

Clark *et al.* (1980) and U.S. Department of Energy (1982).

D2.6 Commissions, Boards and Committees of Inquiry

Applicability

- Applicable, at appropriate scale and level of formality, to all issues and activities.
- Not suitable for routine, repetitive evaluations.

Advantages

- Allows evaluation to go beyond internal perspective.
- "Independent" status confers greater credibility.
- Generally has more power to acquire information than typical evaluator.
- Has greater flexibility in methods employed.
- May be less influenced by internal political considerations.

Disadvantages

- Cost increases and speed decreases with the formality and elaborateness of the proceedings. Except for informal, internal inquiries, the method is very expensive.
- Inquiries are usually reactive and the evaluation can be biased by the nature of whatever occasioned them.
- It is difficult for inquiries to obtain unbiased evidence or to gather a body of information that is not biased in its distribution in favour of certain perspectives or sources.

References

Chapter III, section D2.2.

Bulmer (1980), Doern (1977a), Gorinson (1979), Royal Commission on Health and Safety of Workers in Mines (Ontario, 1976) and Royal Commission on the Ocean Ranger Marine Disaster (1984).

D3. Methods of Gathering Data for Evaluation

D3.1 Document and Literature Review

Applicability

- Generally applicable.
- Least useful in the measurement or estimation of program impacts, especially of an economic nature.

Advantages

- Economical deployment of labour.
- Detailed information can be obtained, but depth of investigation can be chosen so that results justify effort.
- Written records do not depend on memory and are free of hindsight adjustments.

Disadvantages

- Program documents read out of context may be misleading.
- Data gaps because of unavailable or non-existent documentation are common.
- Easy to overlook the need for content analysis or other standardization for source where documents take positions or express opinion.

References

Chapter III, section D1.

Canada Health and Welfare (1984), Davis *et al.* (1981), Denton (1977), Franson *et al.* (1982), Gordon (1981), Muller (1977), Scarff (1983), U.S. Office of the Comptroller General (1980) and Vandervort (1979).

D3.2 Case Studies and Historical Analysis

Applicability

- Generally applicable, but particularly useful for process and organizational issues and analyses of the cost of regulation and regulatory compliance.

Advantages

- Allows greater depth of analysis at detailed level.
- This enables recognition of small features that determine the magnitude and extent of major issues and impacts.
- Also provides illustrations that offer insight into program function and obstacles to its effectiveness.
- Provides rich supporting evidence for evaluation results and recommendations.
- Increases reliability of conclusions and improves recognition of program effects.

Disadvantages

- Time consuming and expensive if conducted thoroughly enough to offer advantages listed above.
- Documentation or oral information may not be readily available from all parties, and may be of uneven quality and reliability.
- Unless case studies are carefully selected for representativeness, the results may have very narrow application.
- Defining the limits of a case study too narrowly render it ineffective; defining them too broadly either reduces quality or overruns budget.

References

Chapter III, section D1.

Some case studies are, in fact, studies of entire programs, for example, Van der Porten (1969), Doern (1976), Lucas and Bell (1977) and Sims (1980). Others deal with specific projects, such as Gibson (1978), Rees (1980) and Ikeda and Winterfeldt (1982) or with events such as Royal Commission on the Ocean Ranger Marine Disaster (1984) and Gorinson (1979).

D3.3 Surveys and Polls by Mail or Telephone

Applicability

- Process, organizational and impact issues.
- All program elements.

Advantages

- Economical and fast.
- Very flexible in terms of coverage and scale.
- Good complement to document review, especially for obtaining information from people outside program.

Disadvantages

- Sample design must take into account different types of respondent.
- Problem can be compounded by low and uneven response rates.
- Questionnaire design and telephone interviewer's manner may introduce bias.
- Responses, especially to mail surveys, tend to be superficial; information may be inadequate.
- May antagonise those affected by program or alarm program staff.

References

Chapter III, sections D1 and D2.1.

There are many social science texts which deal with the design of questionnaires, telephone interview techniques and methods of analysing survey data. These include Grinnell (1982) and Poister (1978). Instructive examples are Kelly (1982) and Alberta (1985).

D3.4 Interviews

Applicability

- All issues and activities.
- Need for this expensive method increases with complexity and qualitativeness of issues and activities.

Advantages

- High participation rate.
- Flexible in terms of coverage and scale.
- Adaptive in execution.
- Uncovers insights, suggestions and anecdotal information not otherwise accessible.
- Good complement to document review, especially for obtaining information from people outside the program.

Disadvantages

- Costly and slow.
- Trade-off between how structured interview is, depth and quality of information obtained and potential for failure in objectivity.
- Requires skilled interviewer to maximize return and to avoid leading respondent to give expected answers.
- May raise respondent's expectations of program performance.

References

Chapter III, sections D1 and D2.1.

Many social science texts deal with methods of interviewing and methods of analysing interview data. Rossi *et al.* (1979), Grinnell (1982) and Poister (1978) do so in the context of program evaluation. Chubb (1983), I.D. Systems (1984) and Slatter (1982) are illustrative examples.

D3.5 Peer Group Review

Applicability

- Process, impact and alternative issues.
- Licensing, standard-setting, and inspection activities with significant technical content.
- R & D activities.

Advantages

- Often the only way of obtaining informed technical and scientific opinion from outside the program itself.
- Evaluates quality of decisions and activities.
- Offers credibility in scientific and technical community, but not necessarily elsewhere.

Disadvantages

- Peer reviews reflect the current received opinion of what is appropriate in a given field. The history of science demonstrates that this is often wrong.
- Peer reviewers tend to share one set of values and perspectives.
- Peer reviewers like to see expenditure in their field of interest continue and expand.
- May be difficult to find peer reviewers not linked to program.
- May be difficult fo identify peer reviewers representative of existing range of opinion.
- An expert manager is required to distil conclusions from peer reviews.

References

Chapter III, section D1.

Science Council of Canada (1982) and Treasury Board (1984).

Peer reviews are economical if the services of the peer reviewers are voluntary. If reviewers are paid at market rates the cost can be prohibitive.

D3.6 Expert Review

Applicability

- All issues and activities.

Advantages

- Economically flexible.
- Rapid access to informed and penetrating opinion.
- Deals readily with non-quantifiable matters.
- Can uncover new information sources.
- Can increase credibility and persuasiveness of results if selection of experts is successful.

Disadvantages

- Subjectivity is difficult to offset because a balanced design of experts is unachievable.
- What is an expert? On what basis are they selected?
- Opinions of experts are likely to be heavily biased by values, perspectives and affiliations.
- An expert manager is required to distil conclusions from possibly conflicting expert opinions.

References

Chapter III, section D1.

Borich and Jemelka (1982) and Hoos (1983) discuss this method, which is recommended by Treasury Board (1985). Canada Health and Welfare (1984), LGL, ESL, and ESSA (1984) and Royal Commission on the Ocean Ranger Marine Disaster (1984) are recent Canadian examples. Muller (1977) is a nuclear regulatory example.

D3.7 Delphi Method

Applicability

- A subdivision of expert review.
- All issues and activities, but particularly useful for rationale, program alternatives and other issues where differences of opinion may be strong and judgements have to be made.
- Should only be applied to specific detailed questions/issues.

Advantages

- Valuable for dealing with specific intractable problems where judgement is crucial and conflict resolution is required.
- Supplements other methods of data collection and review.
- Credibility is high if participants are properly selected.
- Allows reconciliation of different values and perspectives.

Disadvantages

- Expert manager is vital because success is determined by transition from one stage of review to the next.
- Too expensive for broad application.
- Subject to usual dependence on selection of expert participants.
- Consensus may not be reached.

References

Chapter III, sections D1 and D2.1.

Borich and Jemelka (1982), ESSA (1982) and Hoos (1983) discuss the method and its application.

D3.8 Direct Observation of Process at Work

Applicability

- Process and organizational issues.
- Some impact issues such as cost of compliance, but not general impact issues such as overall economic impact.
- All activities.

Advantages

- Verifies respondent information.
- Enables documentation of otherwise unrecorded information.
- Provides detailed information and facilitates recognition of key activity components and obstacles.

Disadvantages

- Difficult to ensure representativeness of activities selected for monitoring, or of monitored activity in general.
- Costly and time consuming.
- Subject to interests, values and perspective of observer.
- Credibility also observer dependent.

References

Chapter III, section D1.

Fox (1979) is a Canadian example. The method is recommended by Treasury Board (1985).

D3.9 Program Simulation

Applicability

- Broadly applicable but particularly useful where consequences of program activity, failure or inefficiency are severe (e.g. threats to human health and safety or high cost).
- Licensing and inspection, especially in relation to health and safety, are prime candidates for more elaborate simulation.
- Can be used to test new program alternatives.

Advantages

- Enables evaluation of program activities designed to deal with rare events. This cannot be easily achieved in other ways.
- Allows great flexibility because simulation can be halted at intervals or rerun.
- Facilitates identification of key points in regulatory process.
- Extremely powerful method for regulatory programs if well planned and well documented.

Disadvantages

- Cost and time increase with realism and detail of simulation. Requires work by program staff.
- Cost-effectiveness depends on tailoring detail of simulation to magnitude of potential program effects.
- Confidence in results depends on realism and accuracy of simulation.
- Requires manager familiar with program operations.

References

Chapter III, section D2.3.

U.S. Nuclear Regulatory Commission (1979).

D3.10 Conferences and Workshops

Applicability

- Applicable to all issues and activities.
- Most useful for rationale, impact and program alternative issues where participation of people with different perspectives is most desirable.

Advantages

- Can be a useful tool in recognizing key questions and activities, or factors that determine effectiveness and impacts of regulation.
- Works best if participants are provided with summary information or descriptive models and specific objectives.
- Can be a relatively cheap way of accessing expertise if participants are unpaid.
- May be useful in recruiting "stakeholders" to an evaluation effort and associating them with recommendations.

Disadvantages

- Results very dependent on who is invited to participate.
- Success dependent on organization, structure and control of sessions.
- Results may be inconclusive or difficult to digest.
- Expensive if real costs have to be paid.
- May raise participants' expectations of action on recommendations.

References

Chapter III, section D1.

Borich and Jemelka (1982), ESSA (1982) and Woods Gordon (1983) describe this group of methods. There are many examples in the literature which report the results of conferences or workshops and summarize their results. These include Doern and Maslove (1979), Royal Commission on the Ocean Ranger Marine Disaster (1984) and U.S. President's Commission on Law Enforcement and Administration of Justice (1967).

D4. Analytical Methods for Evaluation

D4.1 Traditional Scholarly Analysis

Applicability

- Generally applicable, but particularly useful for rationale, program alternative and political, legal or administrative process issues.
- Works best where there is a logical framework of policy, process or organization to structure arguments, or where some explicit ideals are available as criteria for assessment of program performance results.

Advantages

- Flexible and economical.
- Can accommodate treatment of classified information and political sensitivities more easily than other methods.
- Not dependent on availability of quantitative data.

Disadvantages

- Confidence in results and credibility very dependent on competence of analyst.
- Subjective; strongly influenced by values and perspective of analyst.
- Coverage of issues may be uneven, reflecting discipline orientation of analyst.

References

Chapter III, sections D1, D2.1 and D2.2.

What is meant by traditional scholarly methods is the application of analytical thought without extensive recourse to modern methods of quantitative analysis. Ash (1971) is an extreme example as it argues from first principles and uses little data. Most authors do rely on observations and operate within the theoretical framework of a discipline. Examples are the Law Reform Commission reports of which Vandervort (1979) is most specific about legal methods, Hall (1980) (sociological and organizational), Von der Porten (1969) and Sims (1980) (historical) and Jackson (1982), Welborn (1977) and Wilson (1980) (social and administrative sciences).

D4.2 Economic Impact Analysis - General

Applicability

- Impact and program alternative issues.
- Most effectively applied to activities with easily measurable outputs.

Advantages

- This group of methods offers the only way to place a monetary value on program effects. In our society, monetary value is perhaps the single most influential factor in decision-making.
- Notwithstanding the difficulties listed below, there is a large body of published examples to draw on for experience.
- For some evaluation purposes orders of magnitude, as opposed to precise costs, are sufficient and the methods are well enough developed to provide these.

Disadvantages

- Valuation of health effects and of human lives raises fundamental philosophical questions that cannot be solved by technical improvements.
- The effects of a regulatory program are difficult to isolate from those of other factors.
- Secondary effects on, for example, employment or the creation of new economic opportunities may be difficult to recognize or quantify.
- There may be scientific uncertainties in establishing program effects that undermine economic valuation. For example : how much of a reduction in pollution does a program, or regulatory standard, achieve and what is the effect of that reduction on economically valued items such as people and property ? Determining the effects of low probability events such as those of radiation on health is particularly difficult.
- Distributional differences cause valuation problems, especially where regulatory decisions are bound to benefit one group at the expense of another.
- Methods of discounting the values of future effects, and of differential treatment of reversible and irreversible effects are not generally agreed upon.
- Valuation of depletion on non-renewable resources is the subject of debate which reflects philosophical rather than economical values.
- The larger and more complex the program, regulated industry or project, the more difficult the recognition and quantification of impacts.

References

Chapter III, section D2.5.

There are many texts on this subject including Pleeter (1980). Rossi *et al.* (1979) deal with it in the program evaluation context. Papers in the Economic Council of Canada "Regulation Reference" series, reviewed in ECC (1981), provide many examples.

D4.3 Economic Modelling and Simulation

Applicability

- Impact, program alternative and rationale issues, especially at major policy level.

Advantages

- Allows extrapolation to future or to hypothetically changed regulatory and economic conditions.
- Perception of the methods as objective, quantitative and professional gives credibility.
- Once in existence, model can be tuned by means of experience and used repeatedly.
- Model can be used to investigate which variables have most influence on program results.

Disadvantages

- Results depend on data which are prone to disadvantages listed under economic impact analysis.
- Models, and analysts, have difficulty incorporating or anticipating non-linear or qualitative changes such as those due to human behavioural responses.
- Time consuming and expensive, especially in data acquisition.
- People unable to understand modelling methods may be suspicious of conclusions.
- Tendency to weight economic values and considerations more heavily than others that are less easy to quantify.

References

Chapter III, sections C4.2.1, D2.5 and D2.6.2.

Environmental Resources Ltd. (1983), Institute for Energy Analysis (1979) and Krutilla *et al.* 1978) all offer examples of this approach to evaluating alternative development scenarios.

D4.4 Cost of Compliance - Microeconomic Analysis

Applicability

- Issues involving impact on regulated industry.

Advantages

- Responds to most immediate political questions arising from a regulatory program.
- Provides information that is most easily understood of all economic analyses.
- Subject to less theoretical and philosophical disagreements than other economic methods, probably because economic theory of the firm is better developed.

Disadvantages

- Difficulty in obtaining consistent, comparable and accurate estimates of private sector costs.
- Difficulty in defining what is a regulatory cost : e.g. are environmental protection measures good management practice or undertaken only because of regulatory requirements ? How is overhead treated ?
- Tendency to overlook secondary costs arising from planning, design and operational changes made in response to regulatory requirements.
- Credibility may be undermined if data from private sector is not independently confirmed.

References

Chapter III, sections D2.4 and D2.5.

Cook and Woods Gordon (1981), Richardson (1976) and SECOR (1980) deal with costs of compliance. Many of the Economic Council of Canada "Regulation Reference" series, Cowing and Stevenson (1981) and Fromm (1981) offer microeconomic analysis.

D4.5 Analysis of Program Costs

Applicability

- Impact, process and program alternative issues.
- All activities.

Advantages

- Can be accurate and reliable because of accessibility of accurate data, including data from past years.
- Well established accounting and auditing methods can be used if sufficient level of detail is required. Aspects of audit relevant to evaluation issues can be selected.
- Data can be used as input to zero-based budgeting, cost-effectiveness and cost-benefit analysis.

Disadvantages

- May be difficult to distinguish expenditures directed towards individual regulatory objectives.
- Tendency to overlook overhead costs when these are funded outside the program or are part of program responsible for evaluated activity.
- Difficult to take into account the occurrence, or potential occurrence, of exceptional circumstances that may require unanticipated expenditure or the relaxation of principles of economy because of the need for urgent action. This tends to be a proportionately larger problem in small programs (e.g. AECB response to fall of radioactive debris from soviet satellite).

References

Chapter III, section D2.4.

Brown (1971), Hatry et al. (1976, 1973), Jackson (1982), Lyden and Miller (1978) and Steiss (1982) describe methods of assessing program costs. Auditing guides such as Flesher and Siewert (1982), Sayle (1981) and Thierauf (1980) are also relevant.

D4.6 Cost-Effectiveness Analysis

Applicability

- Process, organizational and program alternative issues.
- All activities where objectives are taken as fixed as opposed to cost-benefit analysis which can be used to compare different approaches or policies that allow for adjustment of objectives.

Advantages

- Assumption of fixed objectives focusses on program costs and direct costs to industry necessary to achieve them. These are more easily estimated and quantified than costs or benefits of different objectives, which involve all the valuation problems listed under economic impact analysis. Credibility is therefore enhanced.
- Quicker and less expensive than methods requiring more extensive data and more complex analysis.
- Relatively easy to communicate results.

Disadvantages

- Basic assumption that program objectives can be equally well achieved in more than one way may be unsustainable in non-trivial cases.
- Cost estimates for program alternatives still involve economic and behavioural assumptions of hypothetical cases mentioned under economic impact and cost-benefit analyses.
- Use of cost-effectiveness analysis, where costs and benefits beyond direct program costs and costs of compliance are not quantifiable, can lead to misplaced confidence in the representativeness and applicability of the results.
- The difficulty of determining real private sector expenditures, or of estimating hypothetical ones, remains as stated under cost of compliance.

References

Chapter III, section D2.4.

"Value for Money" audits are concerned with cost-effectiveness (Canada Office of the Auditor General, 1978; Pois, 1979; and audit references under D4.5). Cost-effectiveness usually takes into account matters of administrative effectiveness. Brantingham (1981) is an example, and references under D4.1.2 and D4.1.3 are relevant. Hahn (1979), U.S. National Research Council (1977), U.S. Office of the Comptroller General (1981a) and U.S. Office of Science and Technology (1972) are examples of applying cost-effectiveness analysis to the achievement of program objectives. Knight (1979) describes zero based budgeting.

D4.7 Cost-Benefit Analysis

Applicability

- Impact, program alternative and rationale issues.
- All activities where there is a need or desire to reexamine defined objectives in the context of higher level (e.g. national) goals and policies.

Advantages

- Most conceptually complete economic approach to analysing the net benefit to society of a program.
- Relatively easy to communicate results, especially when differences between cost-benefit of alternatives are great.
- Builds in a standard of comparison by considering alternative methods of reaching overall policy goals. Some of these may be real alternatives practised elsewhere or on other projects. This feature increases objectivity and credibility.
- The information gathered by attempting the analysis and the focussing of attention on the question of valuation and cost is useful in program evaluation and program management, regardless of methodological problems.

Disadvantages

- The difficulties of attributing monetary value listed under economic impact analysis apply to costs and to benefits of program impacts.
- In relying on economic concepts such as allocative efficiency, the method overlooks ethical values, such as equity, and political acceptability.
- Design and valuation of hypothetical program alternatives requires so many assumptions that credibility is always challenged.
- Alternatives practised elsewhere are challenged as not truly comparable because operating conditions are always different.
- The difficulty of determining real private sector expenditures or of estimating hypothetical ones remains as stated under cost of compliance.

References

Chapter III, section D2.4.

Ray (1984), U.S. National Research Council (1977) and U.S. Office of the Comptroller General (1984) are some of the many references worth consulting. Ferguson (1981), Peters (1973) and Schultz in Kernaghan (1983) deal with cost-benefit analysis of regulation. Rossi *et al.* (1979) provide an evaluator's view.

D4.8 Decision Analysis

Applicability

- Program impact and alternative issues, and process issues related to program impacts e.g. #28 in Chapter IV, section C.

Advantages

- The only method to directly attack head-on the uncertainty of attributing values to program impacts, and the difficulty of comparing inherently incomparable quantities such as the cost of safety, pollution control, public health and environmental quality.
- Can identify, by sensitivity analysis, the sources of uncertainty that are important in regulatory decision-making and those that are not.
- Forces recognition of subjectivity of judgements and facilitates its rational treatment.
- Enables estimation of whether effort to gather further information on program impacts will be worthwhile.

Disadvantages

- Because the method must use available data, regardless of quality, it is open to the criticism of "garbage in - garbage out".
- Although uncertainty and subjectivity are squarely faced, the outcome of the analysis is still dependent on subjective judgements by the analyst(s).
- An experienced and highly competent analyst is essential.
- It is costly because most of the work must be done by experienced analysts.
- Subject to the same valuation difficulties as cost-benefit analysis.

References

Chapter III, section D2.3.

U.S National Research Council (1977) provides a general discussion and applies the method to the U.S. Environmental Protection Agency. U.S. Nuclear Regulatory Commission (1979, 1975) report technical applications.

D4.9 Risk Analysis in Program Management

Applicability

- Process, especially decision-making issues.
- Regulation-making, licensing and standard-setting activities.
- Often a subdivision of decision analysis.

Advantages

- In breaking down process into component steps and isolating each step for assessment, it helps identify key points i.e. existence, location and nature of risks to program success.
- Can be used to tie-in financial implications, in terms of costs, benefits and budgetary risks, to components of regulatory activity.
- Can be carried out by trained program staff without external participation and with potential benefit to existing program management if training is provided.
- Can be used to limit uncertainties of valuation and hypotheticality to certain program components, allowing more effective evaluation of the rest.

Disadvantages

- Where major program effects are external and inherently difficult to quantify, this method may misdirect attention to relatively trivial issues.
- Dependent on skilled analyst or demanding participation of program management. The latter can be costly in time spent.
- Estimation of risks associated with program components will usually be subjective. This will cause problems where there are not large differences in risks asociated with different activities.

References

Chapter III, sections D2.3 and D2.6.2.

Risk analysis can be primarily directed at program management itself : i.e. the risk of failure from poor management, lack of funds or other administrative problems (Information Spectrum, 1983). In regulatory programs many risks are associated with the subject of regulation. The introduction of this into the analysis is dealt with by Kraft (1982). U.S. National Research Council (1977), U.S. Nuclear Regulatory Commission (1979, 1975) and Science Council of Canada (1977) are among many references dealing with technological risks. See also references under Decision Analysis, D4.8.

D4.10 Communications Analysis

Applicability

- Organizational efficiency. Examines effectiveness of communication within organization.
- Actual operation of all program activities.

Advantages

- Can lead to improved adherence to policy, and more effective guidelines for regulatory practice by program staff.
- Better communication can maintain good morale and productivity, or improve them if they are below target.
- Can ensure that regulatory agency "speaks with one voice", thereby improving public acceptance.

Disadvantages

- Requires analyst from outside program for best results.
- Not worth cost if internal communication is already good, which is true of many small agencies.
- If surveys and interviews are predominant data source, extensive content analysis and verification may be required.

References

Chapter III, section D2.3.

Dixson (1984) is an example; Goldhaber (1979) and Lewis (1980) are textbooks.

D4.11 Organizational Structure and Behaviour

Applicability

- Organizational effectiveness issues #30 and 31.
- All program activities.

Advantages

- Objective scrutiny of the distribution of work and authority within a program, by an outsider, gives suggestions for improving effective and economic use of resources greater weight.
- Behavioural insights of experienced analyst enable design of more effective working groups and more satisfying goals, incentives, recognition and career options for managers and staff.
- Improved organizational design can increase inter-group cooperation and reduce rivalries that are not cost-effective.
- Can provide independent support for numbers of staff, skills and experience needed to perform program functions.

Disadvantages

- May arouse hostility of program staff if not clearly distinguished from individual performance review.
- Tends to underestimate the significance of individual competence to organizational performance.
- Information obtained from program managers and staff may need elaborate treatment to correct for omissions, bias or hidden agendas.

References

Chapter III, section D2.3.

Hall (1982), Van de Ven and Ferry (1980) and Stewart and Garson (1983) are good general texts and the latter includes nuclear industry examples. Welborn (1977) and Royal Commission on the Ocean Ranger Marine Disaster (1984) analyse regulatory program staff skills and qualifications.

D4.12 Productivity and Operational Effectiveness

Applicability

- Organizational and process issues and related program alternative issues.
- All program activities.

Advantages

- Methods offer a way of countering (or confirming) the perennial criticism that productivity, in terms of quantity, timeliness and quality, in public service programs is low because "there is no bottom line".
- A conscious attempt to quantify program output is likely to provide more reliable productivity data than any alternative.
- This kind of analysis, at least of output volume and timeliness, can be conducted internally by program staff at little incremental cost because many of the necessary data are available.
- Results of productivity analysis lead to recommendations on cost savings and more efficient deployment of resources.
- For some public service programs it is possible to define maximum achievable levels of productivity, and achievable standards of performance against which performance of individual programs can be evaluated.

Disadvantages

- Methods developed for use in the private sector may not be adaptable to public sector programs in which output is not easily measured.
- Methods of quantifying program output may be challenged as arbitrary or biased unless they are based on detailed work analyses. These may be costly and time consuming.
- In regulatory programs, timeliness and quantity of output may be relatively easy to measure even though the product is not uniform. However, the quality of output is probably the most important component of productivity and it is very difficult to measure.
- The use of outside analysts may be necessary where quality of output is evaluated because their use gives the appearance of greater objectivity, thus enhancing credibility.

References

Chapter III, section D2.3.

Price (1968), Keeling (1972), Jackson (1982), U.S. General Accounting Office (1984), Mazmanian and Sabatier (1981), Mazmanian and Nienaber (1979), Brown (1971) and Adam and Dogramaci (1981) all describe applications of this group of methods to government programs. Zammuto (1982), Ghorpade (1971), Murphy (1981), Steiss (1982) and Stewart and Garson (1983) also include relevant discussion or examples.

D4.13 Audits and Program Efficiency

Applicability

- Process Issues #23, 24, 29 and Program Alternative Issue 35.
- Most useful for essential administrative and support activities where objectives and rationale are not at issue.
- Traditional financial audits focus on whether funds are spent in accordance with legal and policy requirements. These are not normally part of program evaluation. Operational, management and comprehensive or "value for money" audits do overlap program evaluation.

Advantages

- An audit brings a comparative perspective based on audits of other programs.
- Auditors' methods of scrutiny of financial management and interviews of program staff are based on standard professional practice which facilitates interpretation of results.
- Focus of attention on management procedures and control systems can complement other types of evaluation.
- Auditors have a tradition of independence in reporting results and making recommendations.

Disadvantages

- Standardization of auditing methods reduces flexibility in application.
- Unless a program is badly managed, auditing can be a costly and time consuming exercise for meagre returns.
- In management and comprehensive audits, interpretation of interview and other data, and development of evaluation recommendations, is very dependent on the experience and perspective of auditor. The perspective may differ from that of the commissioner of evaluation.
- Comprehensive and management auditing require different approaches and different skills from those required for traditional financial auditing.

References

Chapter III, section D2.4.

Brown (1971), Canada Office of the Comptroller General (1978), Flesher and Siewert (1982), Pois (1979), Sayle (1981), Steiss (1982), Thierauf (1980) and U.S. General Accounting Office (1984) are relevant references.

D4.14 Socio-Economic Impact Analysis

Applicability

- Rationale, impact and program alternative issues.
- Activities having major direct or indirect impacts on the public.

Advantages

- Deals with secondary social impacts of regulation that are difficult to treat by accepted economic methods and are often ignored.
- Provides information required for review of major policy issues, especially at the political or quasi-political level.
- Although the methods are far from perfect, some systematic attempt to address these issues is better than none, and practice improves with experience.

Disadvantages

- Disagreement between social scientists about definitions, selection of variables, social indicators and specific analytical methods for SEIA.
- Disagreement about society's goals in general areas such as quality of life at the level of the individual, the community and the nation.
- Difficulty of gathering accurate representative data, inherently qualitative nature of many variables and difficulty of excluding personal philosophy and politics of analyst make objectivity difficult to achieve.
- Thorough application of the method is costly, time consuming and requires a variety of expertise. Its application is therefore limited to major issues.

References

Chapter III, section D2.1.

Doern (1979) describes the Canadian government approach to SEIA and Globerman and Rothman (1983) provides an example that follows that pattern. Finsterbusch (1980) and Colorado State University (1975) offer detailed descriptions of methods.

D4.15 Specialized Methods of Technical Analysis

Applicability

- Impact, alternative and rationale issues.
- Activities with high scientific, technical or professional content, such as standard-setting and defining license conditions, and inspection and enforcement. (See "References" below for examples.)

Advantages

- Indispensable to evaluation of many programs involving complex technology, health, safety and environmental impacts, or effects on human behaviour.
- Provides analytical insights into the nature and mode of action of impacts arising from the program or the regulated activity that are not available from economic based evaluation methods.
- Necessary for economic impact assessments in resource industries where technical methods are used to estimate, and evaluate estimates of, resource use, resource reserves and sustainable yield of renewable resources.

Disadvantages

- Analyses may be forced to rely on data gathering methods that do not meet appropriate standards of rigor, or use poor quality data because nothing better is obtainable. This may undermine the power of the most elegant analytical method.
- Most methods require the services of well qualified experts and time consuming and costly data gathering and analysis. They are therefore too expensive for use in programs that are neither costly nor have major impacts.
- Difficult to explain the results of complex technical analyses to users of evaluation not well versed in the subject.

References

Chapter III, sections D2.6 (all subsections) and D2.7.

This group of methods is so diverse that it requires further explanation. Most specific technical methods are not recognized as methods of program evaluation. For example, reservoir engineering analysis might be used to estimate oil and gas reserves in order to determine the impacts of government regulation of the oil and gas industry. This kind of analysis does not appear in program evaluation manuals, but it is essential to the evaluation of these programs. There are many such methods that might be used in evaluating AECB's program.

Methods available to review technical aspects of standard-setting are exemplified by Hart (1982). Beeghly et al. (1968) and Doern (1978, 1977a) are relevant to the nuclear industry. Such methods would come into play in evaluation of AECB's licensing activities. Methods of technology assessment (e.g. Reid Crowther, 1980) and analysis of risks arising from technology and operation failure (U.S. Nuclear Regulatory Commission, 1975) are also obviously relevant. Scientific and technical analysis of impacts on public health and the environment are also applicable to AECB evaluations. The AECB publication list includes many studies of this kind. The Board has used them in its regulatory practice, but has not presented them as contributors to program evaluation.

Finally, there is a set of highly technical methods available for estimating the effectiveness of inspection and enforcement programs (e.g. Baker and Meyer, 1979; Blewett et al., 1985; Harrald et al., 1979). These methods deal with the problem of measuring deterrence - i.e. what people refrain from doing. They also are applicable to AECB's program. Reviewing these methods individually, in technical detail, is beyond the scope of this report.

D5. Recommendations

These recommendations are intended to offer a brief reminder of matters that should be considered when selecting evaluation methods. The information about actual evaluation methods provided in this section of the report is intended to assist in selecting the appropriate method or methods in any evaluation. When consulting it, the following considerations will come into play.

1. The first two points refer to the earlier steps in evaluation. It is essential at this stage to recall the perspective of the evaluation and the values, principles and criteria that are to be used when making judgements. It is also important to have in hand a precise statement of what it is you want to know. If both are clear, the selection of methods will be much easier.

2. The next step is to decide what level of effort should appropriately be devoted to an evaluation. To do so, it is necessary to consider the cost of a program and its potential financial, ethical and political effects. In general, it makes no sense to spend a large amount to evaluate the efficiency of a program that uses little in the way of funds and resources. However if that program has large consequences, greater expenditure may be justified. This point is directly applicable to AECB which employs relatively meagre resources. On the other hand, the Board regulates an industry which has major economic impacts and which can have impacts on public health and the environment that raise ethical and political issues that cannot be ignored. Decisions about

AECB expenditure on evaluation will naturally be influenced by the results of particular program activities as well as the resources devoted to them.

3. Linked to the question of cost is the need to decide on the level of detail and exhaustiveness to which an evaluation should proceed. For non-controversial issues, for mainly internal activities such as administrative and support functions, and for relatively simple activities with well understood effects, it may be sufficient to gather information from program staff alone; in other cases, those affected by the program may have to be canvassed. The latter implies greater expense. Similarly it may be possible to economize by using program staff and internal services to gather information for evaluation and to perform analyses. This is less likely to be possible where more elaborate methods are required, or where the appearance of objectivity is important.

4. Finally, it is necessary to consider whether the evaluation question can be satisfactorily answered and whether it can be satisfactorily answered by the method selected. It is pointless to spend money attempting to answer the unanswerable or obtaining an answer that commands no confidence. Factors to take into account in assessing answerability are whether program effects can be distinguished from other sources of variation, whether program effects are inherently unmeasurable, whether data are likely to be biased or unrepresentative to an extent that cannot be corrected and whether results are likely to be so open to interpretation or inconclusive as to be useless. In making these assessments, the availability of a vast range of analytical methods to correct for bias and to improve interpretation should be taken into account, as should their limitations.

5. The reader may find the comments on the various evaluation methods that are presented in this section rather general. It is evident, from the above discussion, that those observations were general because the applicability of any method can only be properly assessed on a case by case basis. Applicability varies with evaluation question, program activity and industry or public affected by the program. It is also influenced by the perspective, values and needs of the commissioner of evaluation. Inevitably the reader commissioning, planning or conducting an evaluation will seek more specific guidance when armed with the detailed information listed above. At this point, he or she should consult the literature identified in this section and in the referenced sections of Chapter III.

E : USE OF EVALUATION RESULTS

E1. The AECB and Program Evaluation

Treaury Board (1981a) sets out in great detail the place of program evaluation in public service management and places on the "Deputy Head" the responsibility, not only for commissioning evaluation, but also for implementing the resulting recommendations. In the case of AECB, the Deputy Head is the President.

There are two reasons why implementation or incorporation of evaluation results into Board practice are not likely to be difficult. One is that AECB is a small program with no evident problems of internal communication. This means that program staff are likely to have the opportunity to comment on proposed changes in regulatory practice or program organization, and will fully understand them when they are made.

The second is that the Board has always devoted careful attention to its legislative mandate and to the challenge of fulfilling its mandate in an effective and efficient manner (see Sims, 1980 for many examples). There are many AECB publications in which the Board's mandate and regulatory practices are dissected and explained (Asmis, 1981; AECB Staff, 1983; Domaratzski, 1984; Dory, 1982; Gummer, 1982; Ishack, 1981; Jennekens, 1980; Joyce, 1981; and Marchildon, 1983). In addition, the Board has carried out, or had carried out under contract, many projects that are evaluative in nature even if they have not been recognized as forms of program evaluation. This applies to much of the Board's research on safety, and on the effects on public health and the environment of radioactive substances and other toxic materials used or produced in the nuclear industry. The Board has long experience of incorporating the results of such studies into its regulatory process.

AECB has also been the subject of a number of external reviews or evaluations that have dealt with all or parts of its program. Doern has written a number of papers on the Board and AECL (e.g. Doern, 1976). Other authors who have dealt with some of the Board's work are Fox (1979), Vandervort (1979), and Law Reform Commission (1980) in the LRC series on independent regulatory agencies. The Board has had the opportunity to review the findings of these authors and has taken them into account in its continuing self-analysis. Finally, AECB has commissioned some direct evaluation style studies (SECOR, 1984; 1980; and this study) and has included evaluative data in its annual estimates and multi-year operational plan.

It is clear that the use of evaluation results is not likely to present a problem to AECB because of its past experience. The ability of the President to act on such matters is a further guarantee of appropriate action. Nevertheless there can be situations in which difficulties arise, particularly where other participants in the regulatory process, such as other government departments, are involved, or where major internal rearrangements of staff and responsibilities are necessary. Chapter III-E reviews the literature in this area and identifies some useful references. Most of these offer diagnoses of obstacles to change. Few offer more than common-sense advice on implementing change so that those affected will accept it. Although ESSA (1982) deals specifically with environmental assessment and resource management it is the most interesting. It breaks down the groups, organizations and individuals who must accept proposed changes into types and suggests how best to secure the support of each type. These papers all make the reasonable assumption that changes that are accepted by those who must implement them will be better implemented. AECB experience (Sims, 1980) bears this out.

E2. Recommendations

1. AECB should retain its practice of continuous reevaluation of its program, under the direction of the President.

2. AECB should continue its involvement of program staff in the planning, management and execution of evaluative studies as well as in the implementation of the resulting recommendations.

3. Where difficulties are encountered in gaining acceptance of evaluation rationales or recommendations, references reviewed in Chapter III-E may offer applicable advice.

ACKNOWLEDGEMENTS

We wish to thank Dr. R.V. Portelli, Concord Scientific Corporation, for his professional advice. We thank the staff of the University of Calgary and AECB Libraries for their assistance in our search of the literature. AECB staff have been very helpful to us in completing this project. We also wish to thank the many people who responded to our written request for information by sending us regulatory and evaluation reports.